Chapter 3 General Planning and Design Guidance

Chapter 3

3-1 General

a. INTRODUCTION This chapter provides criteria which will assist using service and design agency personnel in the planning and design of military police facilities and will aid in the evaluation of functional requirements, pre-design concepts and design development documents. This guidance will also assist using service personnel in the preparation and evaluation of planning and design data required to establish project need. The general criteria contained in this chapter will assist installation, Facilities Engineer and Corps of Engineers field or district office personnel in determining the most effective constructron program suitable to the development of required Army military police facilities. Planning and design must be accomplished in conjunction with Army regulations and DOD criteria referenced within. This chapter contains governing criteria generally applicable to the construction of new military police facilities. For projects involving the modernization/improvement of existing facilities, this chapter should be used only as a general reference, more specific guidance for such projects is provided in Chapter 5, Criteria for Upgrading Existing Facilities.

b. EMPHASIS This chapter is directed towards establishing guidelines for the planning and design of the total facility and in correlating the various steps and activities that are part of this comprehensive planning and design effort. A thorough understanding and careful use of the General Planning and Design Guidance should aid in the physical development of an economic, efficient and functionally effective facility with a life cycle cost and operating and maintenance features in keeping with the long-term requirements of military police operations. Use of this guidance will also assist using service and design agency personnel in coordinating interior and exterior design requirements while maintaining a consistently high level of architectural quality and construction value.

c. REQUIREMENTS To accomplish the planning and design objectives of individual projects, the using service must carefully identify functional needs in terms of specific design elements: site, building, structural system interior design, furniture and equipment, environmental services and user information, including, where need be, detailed specifications for the acquisition and installation of interior and exterior furniture and equipment. In addition to providing the necessary MP operations guidelines and general equipment checklists, the using service, with the assistance and cooperation of the design agency, must also provide detailed performance operation and maintenance standards for the design and construction or acquisition of special facilities and equipment used exclusively for military police operation. In all cases, the planning and design of military police facilities must reflect the criteria and guidance contained in current and relevant Army regulations, technical manuals as well as the general DOD criteria referenced in this document. It is essential that all pertinent MP documents be reviewed by the project coordinator, and operating requirements correlated with specific design and constructron requirements.

3-2 Site Design Considerations

a. GENERAL Requirements for site design are discussed in the following paragraphs. Table 3-1 provides a checklist of important considerations which the using service must take into account in identifying specific site design considerations. In all cases, sites should be selected in accordance with procedures established in AR 210-30. Generally, site location should conform to that established on the installation Master Plan approved

Table 3-1: Site Design Considerations

- **(1) Building/Site Relationships**
  - (a) Parking/Vehicle Access
  - (b) Development Easements
  - (c) Buffer Zones
  - (d) Visual Approach
  - (e) Views
  - (f) Desirable Elements
  - (g) Undesirable Elements
  - (h) Micro-Climate
- **(2) Vehicular/Pedestrian Systems**
- **(3) Physical/Visual Access**
  - (a) Public Access
  - (b) Private Access
  - (c) Confidential Access
- **(4) Provisions For Handicapped**
- **(5) Building Services**
- **(6) Lighting**
- **(7) Landscape Planting**
  - (a) Uses
  - (b) Parking Area
- **(8) Signage**
- **(9) Site Furniture**
- **(10) Site Utility Support**
  - (a) Heat
  - (b) Electrical
  - (c) Water
  - (d) Storm Drainage
  - (e) Sanitary Drainage
  - (f) Location

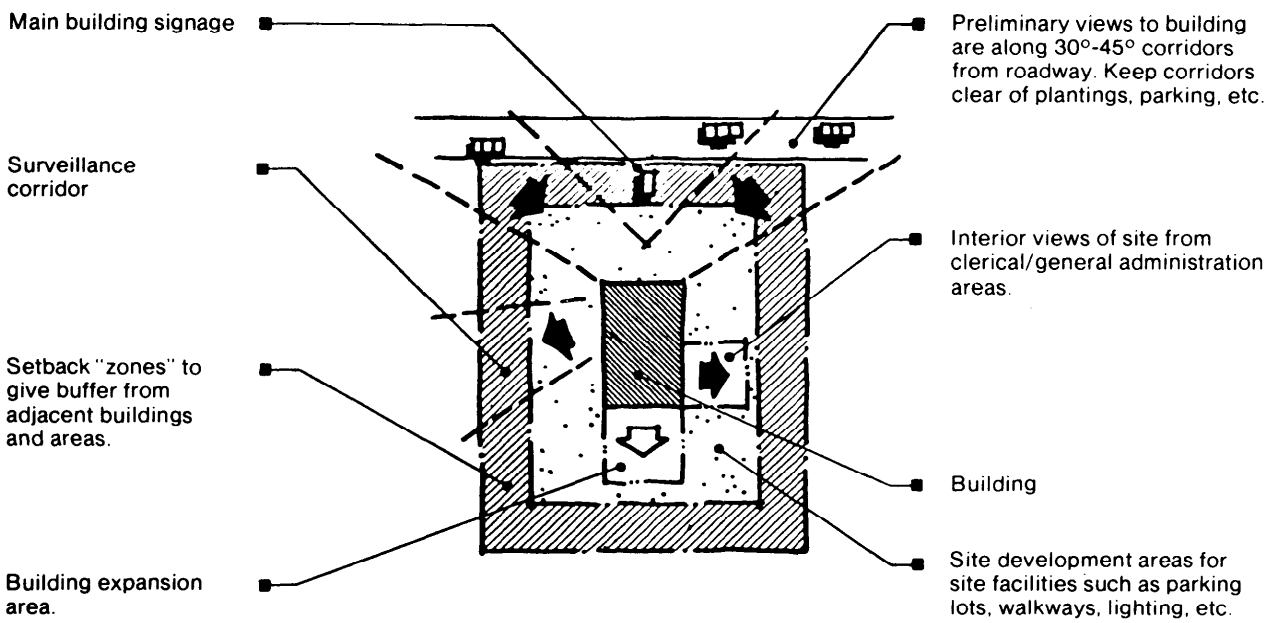
by Headquarters, Department of the Army Site planning and the organization of site elements should be based on procedures and guidelines contained in DOD Manual 4270.1-M, TM 5-803-3 and TM 5-822-2. Actual site planning documents required by individual projects should be prepared in accordance with procedures and guidelines contained in TM 5-803-3.

b. BUILDING/SITE RELATIONSHIPS Siting of buildings should be developed with reference to guidelines and procedures contained in TM 5-803-3. This document provides site orientation guidance as related to sunlight, prevailing winds, and the effects of solar load on mechanical systems. Figure 3-1, below, provides supplementary guidance. The following factors must be considered and provided for in establishing proper building/site relationships:

(1) Separate Parking and Vehicle Access Access to military police facilities is divided into two categories: public and private. The site design characteristics of public access, whether by vehicle or as a pedestrian, should clearly indicate openness to visitor traffic. In addition to the programmed public parking, consideration should be given to the use of shared parking with other facilities to provide for peak load visitor traffic. The private access will include: secured parking for operational and impoundment areas (The area for the operational vehicles may serve a dual use for guard mount), screening of secured parking areas and patrol – POV parking. Parking for POV vehicles does not require a secured area and should conform to paragraph 3-2c, "Vehicular and Pedestrian Systems." Consideration should also be given to the construction of planted earth berms to provide visual screening beyond the secure fencing of the police/offender entrances and secured parking areas.

(2) Development Easements Figure 3-1 shows site constraints that should be considered in identifying development easements. There are several areas of the site upon which little development occurs, but which, nevertheless, are important for the open space which they represent. Certain site areas should be reserved for future building or site element expansion. While the planting of large-scale trees or intensive site development should logically be withheld from these areas, non-permanent landscape

Fig. 3-1 Building Site Considerations



elements can still provide the project with accent and interest. The use of low to medium shrubs, non-permanent benches and other movable or replaceable site elements should be considered.

(3) Buffer Zones Another area of the site which should be "reserved" for open space or future development is the site development buffer zone adjacent to the project boundaries. Similar to "yard" setbacks, this space is necessary to provide the "breathing room" needed to separate this facility from adjacent uses. This is especially important due to the nature of security and confidential operations located on the private side of the site. Specific zone distances should be established in Figure 3-1 as "minimums" and not as "preferred distances". The extent of the buffer zone should be as large as conditions allow and should take into consideration:

(a) Existing Land Uses Consider the compatibility of MP activities with surrounding land uses, especially the proximity of adjacent uses

(b) Existing Landscape Features Preservation of natural landscape features is an important site design consideration. Use of a buffer zone can effectively maintain the presence of existing trees or other plant material

(c) Project Scale Consider the impact on the surrounding natural and man-made environment caused by the scale of project development: i.e., land use intensity, building height and mass.

(4) Visual Approach Persons approaching the site by car normally view the building from an oncoming angle of from 30 to 45 degrees, rather than from directly in front. This oblique view of the facility is frequently necessary to give the appropriate advance identification needed for turning into the entrance drives. For this reason, location of site elements such as parked cars, eye-level flowering trees, or groups of evergreen plantings that might obscure views in these areas should be avoided. In addition, groups of existing trees should be selectively pruned to permit these views.

(5) Views Location and orientation of the building should consider the utilization of any existing pleasant off-site views and the avoidance and/or screening of any objectional off-site views. Refer, in general, to TM 5-803-3 and DOD Construction Criteria Manual 4270.1-M.

(6) Desirable Site Elements Site planning should also consider the preservation of any natural amenities of the existing site. Refer to DOD Construction Criteria Manual 4270.1-M and to TM 5-803-1, "Preservation of Existing Vegetation." The relationship and ultimate effect of proposed grading to the existing contours of the site should be studied, and plans should be developed in conformance with guidelines and objectives contained in the TM 5-803-3, DOD Construction Criteria Manual 4270.1-M, and TM 5-803-1. In addition, the design of site grading requirements, which are generally indicated as part of the project site plan should be developed to accomplish proper storm drainage as outlined in above referenced documents.

(7) Undesirable Elements Due to their strictly utilitarian purpose, site plan elements, such as transformers, electric poles, vaults and meters, are rarely considered desirable additions to the aesthetic development of sites for important community service facilities. Though essential to the fundamental operations of the building and its systems, such elements must be located carefully to avoid detracting from the otherwise pleasant character of the site development. Location considerations should conform to guidelines contained in DOD Construction Criteria Manual 4270.1-M and TM 5-803-3.

(8) Micro-Climate In establishing proper building/site relationships, special consideration should be given to micro-climatic conditions; especially variances in anticipated directions or intensities of prevailing winds caused by the diffusing effect of existing trees or the intensifying effect of wind currents caused by adjacent land forms. Site climatic conditions should not be identified solely on the basis of generalized regional patterns but should be verified by inspection of actual on-site features.

c. VEHICULAR AND PEDESTRIAN SYSTEMS Vehicular and pedestrian systems must be established for site access, circulation and parking. Safe and convenient systems should distinguish between the various groups and individuals who use this facility. Design of pedestrian and vehicular systems should conform to the guidelines contained in DOD Construction Criteria Manual 4270.1-M and TM 5-803-3. Particular emphasis should be placed on providing for the accessibility, safety and convenience of the physically handicapped. Where possible, the desirable layout of roads, parking and walkways should avoid locations directly over underground utilities. Geometric and permanent design of roadways, driveways, parking spaces and walks should conform to provisions contained in TM 5-822-3, and DOD Construction Criteria Manual 4270.1-M.

d. PHYSICAL AND VISUAL ACCESS Due to the public, private and confidential nature of MP operations, physical and visual separation of the access to the facility must be achieved in order to reinforce the distinction between the various types of visitors to an MP facility. The ability to express this separation clearly and logically

must be the basis of determining the location of roads, drives, parking, and walks and entrances. Figure 3-2 indicates some of the planning and design considerations essential to the provision of adequate physical and visual access. The principal characteristics and requirements of physical and visual access are:

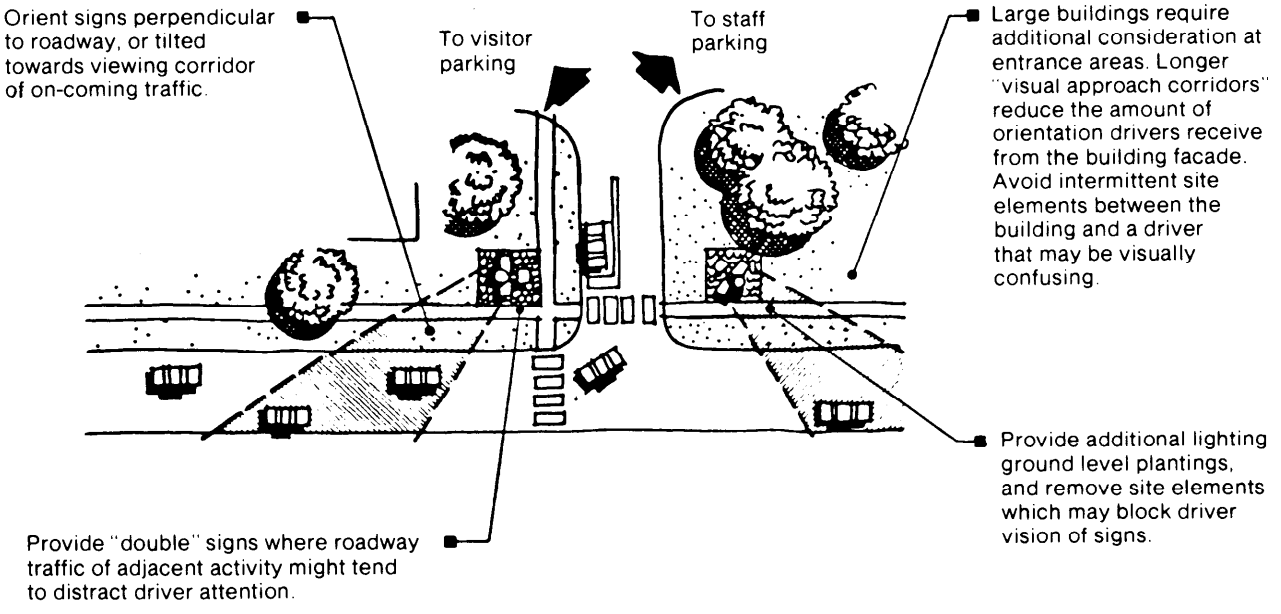
(1) Public Access Since accessibility to certain functional activities and the separation and control of visitor circulation can become confused on a first visit, directional signage and the design of the physical landscape should be used to assure proper public access. Provisions for the control of the public's physical and visual access should be made whether it is by vehicle or as a pedestrian. Consider scale and aesthetics in the choice of paved areas and pedestrian facilities, pedestrian scale lighting, signage and decorative planting in public access areas.

(2) Private Access Private access is used primarily by those who have familiarity with this facility: unit commanders, law enforcement personnel, civilian liaison and personnel from CID and other support elements. Therefore, signs and identification should be designed to indicate to the casual visitor that this is not the approach to his entrance rather than to advertise that this is the area of critical operations. The necessity of providing security during suspect/prisoner transferral and for nighttime shift parking or the inspection of patrol vehicles dictates the need for enclosure. Ideally, this enclosure should not resemble the institutional image of barbed wire and chain link fencing. Instead, consider a wall or screen made of the materials of the building, providing visual separation from the public entrance and presenting a less hostile, more pleasant character as well. Design considerations for suspect access points should reflect the fact that prisoners remain only suspects at this point and may ultimately be found innocent. However, to maintain security and to avoid congestion in critical operations areas, other staff using this facility should not be required to pass through this area. Monitoring by CCTV and use of electronic sensors should be considered for surveillance of private access and critical operations areas.

(3) Confidential Access Access for confidential staff involves a less intensive physical character than that required for private access. Public access expresses the important community service aspect of the military police program. Private access stresses the day-to-day aspect of police operations and takes on the more routine function of handling the daily traffic of law enforcement personnel. Because of their differences, the public and private access areas, including the suspect/prisoner entrance, should be visually separated from the confidential access area required by military police investigators. There is a special need for this separation, especially between the confidential access area and the public entrance. This is due to the somewhat confidential nature of work by certain investigations personnel.

e. DESIGNING FOR THE HANDICAPPED The handicapped are classified as a special category of user Careful consideration, therefore, must be given to their unique physical needs. Handicapped users may include both manually and visually as well as audially impaired.

Figure 3-2 Visual Approach Considerations

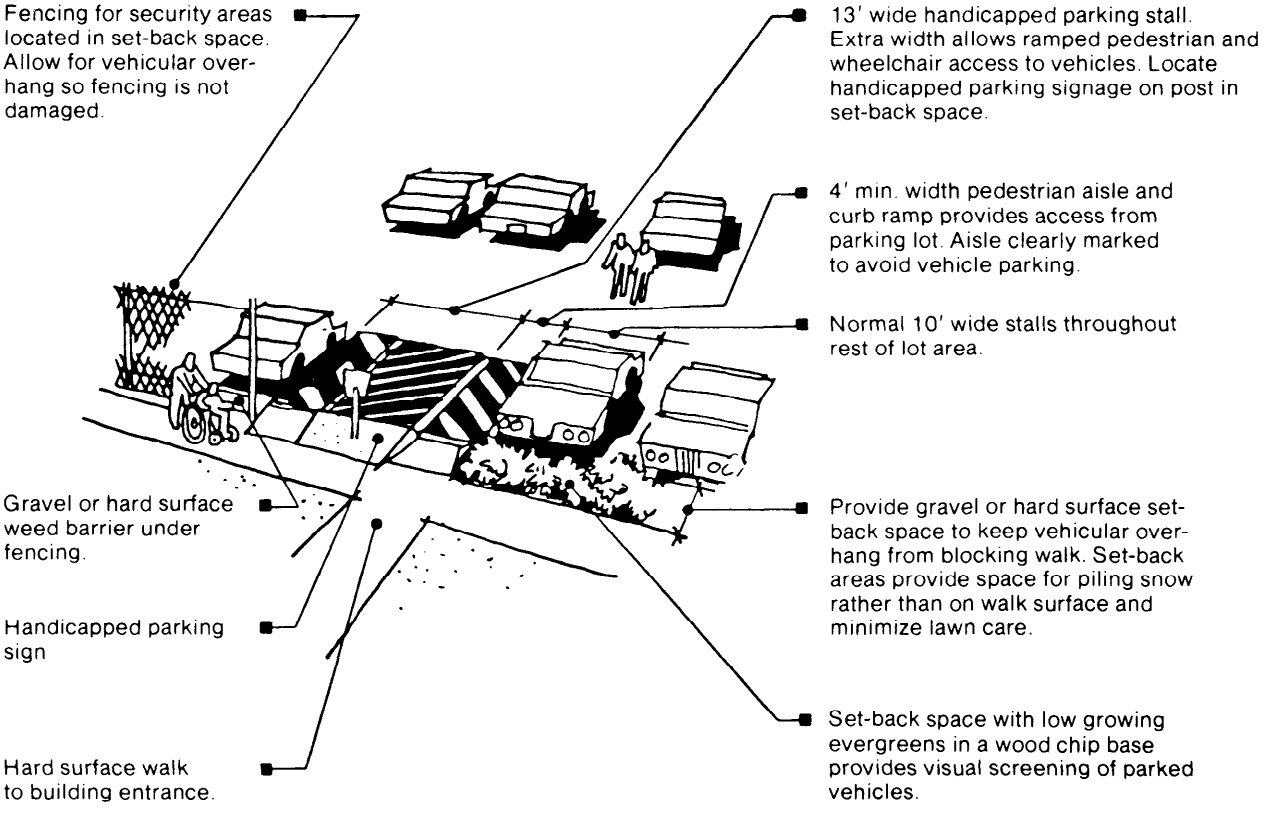


Since they also may be involved in both staff and visitor related military police activities, special attention must be given to making the full range of required building and site facilities reasonably accessible to, and fully usable by, the physically handicapped. This need for access to and use of military police facilities will be an important factor in the initial planning and design of building and site elements. Actual requirements for the handicapped that result in the provision of special features in certain site elements will depend on the level of severity of impairment that is used as a design criterion, i.e., totally blind people may need site signage that includes braille lettering, special hardware may be needed for use by amputees, access for wheelchaired users can be improved by providing automatic door opening devices, etc. General design standards for the handicapped should be considered in the design of such site elements as paved surfaces, natural surfaces, curbs, drainage and utility vault grates, crosswalks for driveways and parking areas, outside ramps, stairs, handrails, railings, seating areas, drop-off and pick-up zones, parking spaces, plantings, lighting, signage, telephones and site furniture (trash receptacles, benches, sign posts, fencing, utility poles, etc.). For detailed guidance, refer to DOD Construction Criteria Manual 4270.1-M and to ER 1110-1-102 and EM 1110-1-103 which contain generally applicable standards.

(1) Public Access and Site Circulation Vehicle registration, public information, on-duty police desk assistance and other military police services as well as certain operations and administrative support activities generally involve interaction with the public. Typically, military police activities in this category are directly accessible from or adjacent to the main visitor entrance. Since one of the types of visitors to a military police facility may be the handicapped, the design of pedestrian and vehicular access and site circulation features should not impose a barrier to their use of the facility. Signage must be large enough to be easily read by handicapped people with visual impairments. Curbs, walkways, parking spaces, ramps, stairs, entrance approaches and doorways must be designed with careful consideration for the physical needs and dimensional requirements of handicapped people with manual impairments who might use mechanical aids (wheelchair, cane, crutch, etc.). The design of site elements unique to the needs of the handicapped, such as gently sloped ramps oversize doorways, etc., must conform to the guidelines and criteria contained in the above referenced documents.

(2) General Parking Figure 3-3 illustrates the need to provide specially marked and reserved parking stalls designed to accommodate the handicapped.

Figure 3-3 Handicapped Parking Requirements

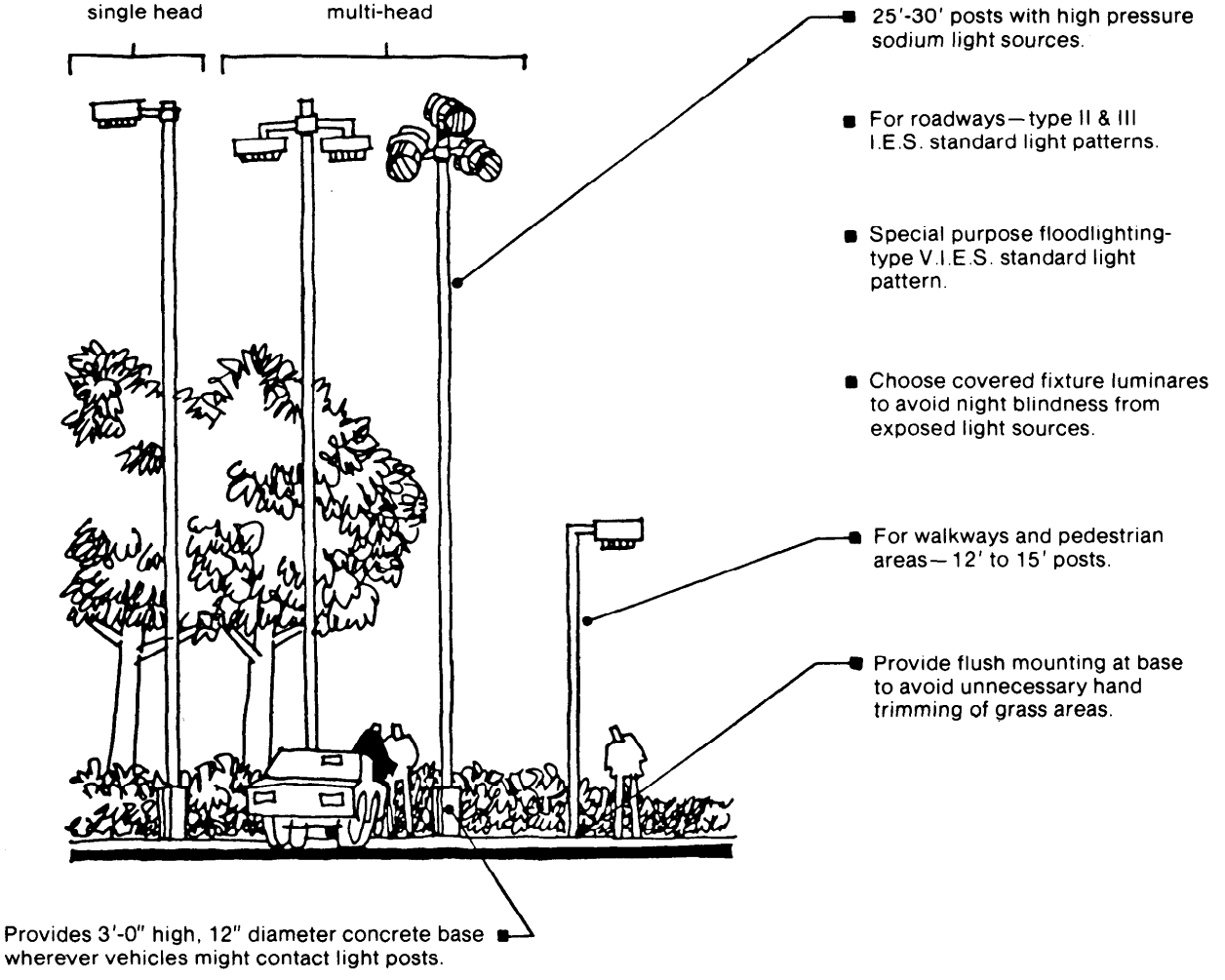


These stalls should be located in visitor and staff parking areas nearest the routine trip destination of visitor, staff and military police personnel. This normally will be directly opposite or adjacent to the principal visitor or staff entrance, but no more than 100 feet from at least one building entrance usable by the physically handicapped. Parking space designated for exclusive use by physically handicapped people must be of sufficient width (at least 13 feet wide) to provide for wheelchair access to both sides of a vehicle and to open doors fully.

(3) Use of Facilities by Handicapped Staff Site design features and unique provisions for either temporarily or permanently handicapped military police personnel or staff (usually civilians) may go beyond those prescribed by the above referenced documents. The identification of such requirements will be determined at the local level on a project-by-project basis, and will be in accordance with currently applicable engineering and design standards. Such requirements generally involve special designs for staff entrances, the need for automatic door openers, ramps, stairs, or special hardware or equipment, and the layout of outside operations areas which might need special provisions to accommodate the handicapped.

f. LIGHTING Lighting for site areas should refer, in general, to DOD Construction Criteria Manual 4270.1-M and TM 5-803-3. More specifically, exterior site lighting can be helpful in conveying an inviting atmosphere desirable at public parking and entrances. Proper selections of pedestrian-scaled fixtures and poles should coincide with major walkway areas. Choice of fixtures and poles should reflect the materials, shapes, and colors used in the building. Choose shapes and materials which are durable and whose sturdiness of construction is appropriate for the normal abuse and wear in operational areas such as this. Poles should be located where they will not interfere with pedestrian or vehicular movements. Lighting for various site areas should conform to Illumination Engineers Society's recommended footcandle levels. Selection of security

Figure 3-4 Site Lighting Considerations



lighting should be in accordance with FM 19-30. Refer to Figure 3-4 for guidance.

g. SERVICE The site plan should incorporate adequate space for access by service vehicles, such as fire trucks, ambulances, and trash trucks. Refer to DOD Construction Criteria Manual 4270.1-M. In addition, conform to requirements in TM 5-803-3 and TM 5-812-1.

h. LANDSCAPE PLANTING Development for military police facilities should include new plantings of trees and shrubs, the establishment of lawn areas, and, where possible, the preservation of existing vegetation, all as required in DOD Construction Criteria Manual 4270.1-M, as well as TM 5-803-3. When designing the planting, consider the selection of plant materials which are readily available, easily maintained, compatible with the surrounding environment, and whose ultimate growth characteristics are appropriate to the use for which they are intended. Layout application selectton should conform to guidelines expressed in DOD Construction Criteria Manual 4270.1-M and T 5-803-1. Considerations for choices of appropriate grass types should not exceed TM 5-830-2. Refer to Figure 3-5 for guidance.

(1) Uses Trees and shrub plantings should be incorporated into the plan of site development to effectively modify conditions of temperature, glare, wind, dust, smoke and noise. Refer to more specific guidelines contained in TM 5-830-1, as well as DOD Construction Criteria Manual 4270.1-M, and as illustrated in Figure 3 on Page 6 of TM 5-803-3.

(2) Parking Area When designing the parking area, consider buffer screening, planting medians, and substantial islands of vegetation as appropriate to screen and break the visual impact of long-paved areas. Rather than hide the parking, the purpose of these elements is to provide an aesthetic balance between the paving and the cars. A desirable ratio is for large-growing trees to be spaced approximately fifty feet on center, as recommended in TM 5-830-a.

Figure 3-5 Landscape Planting Considerations

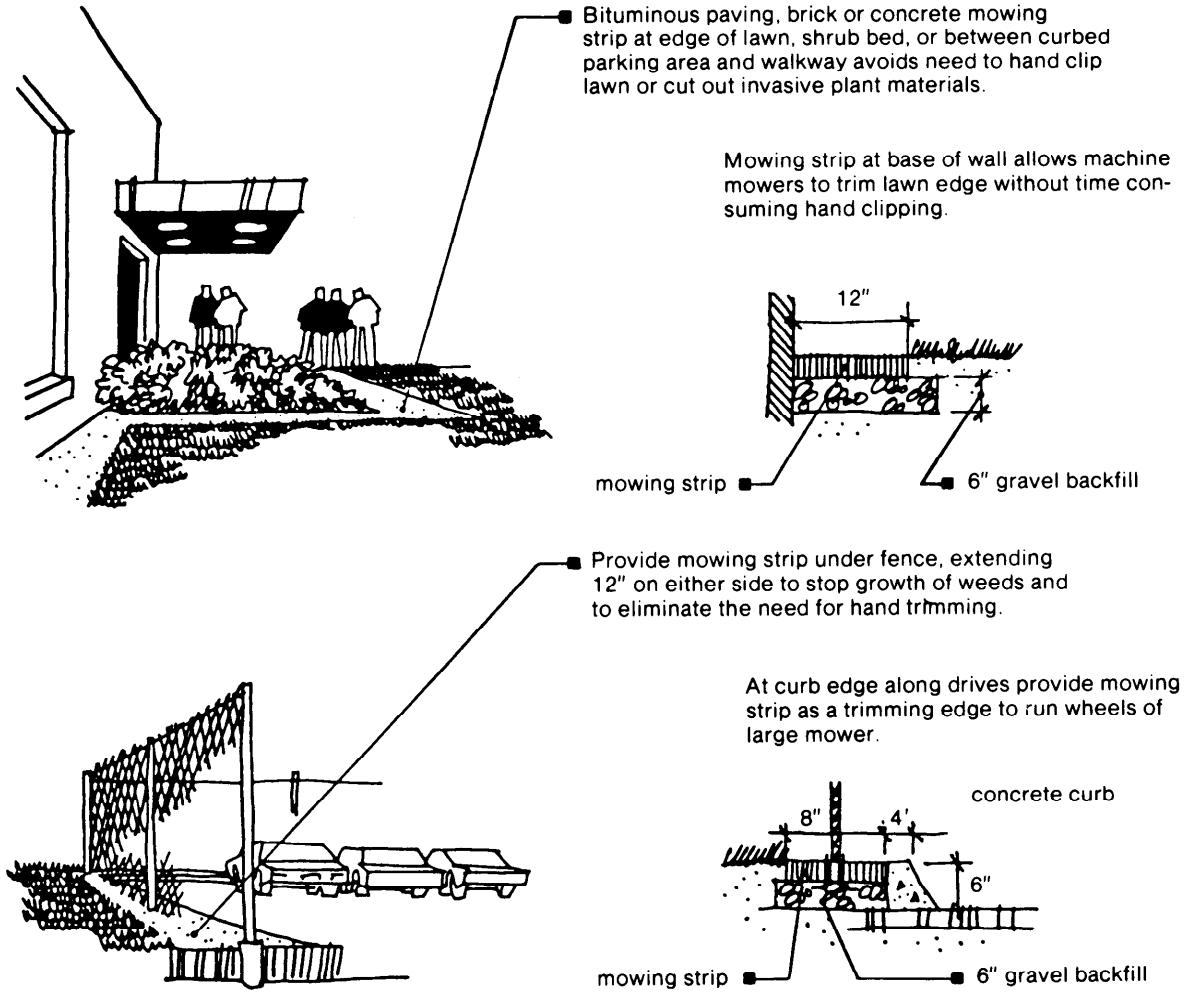
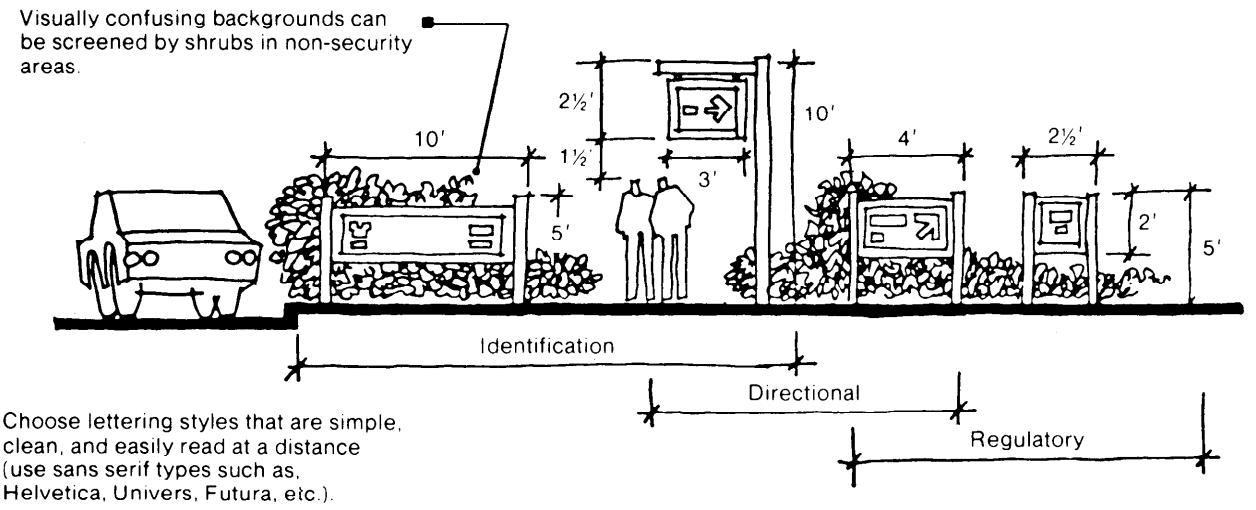


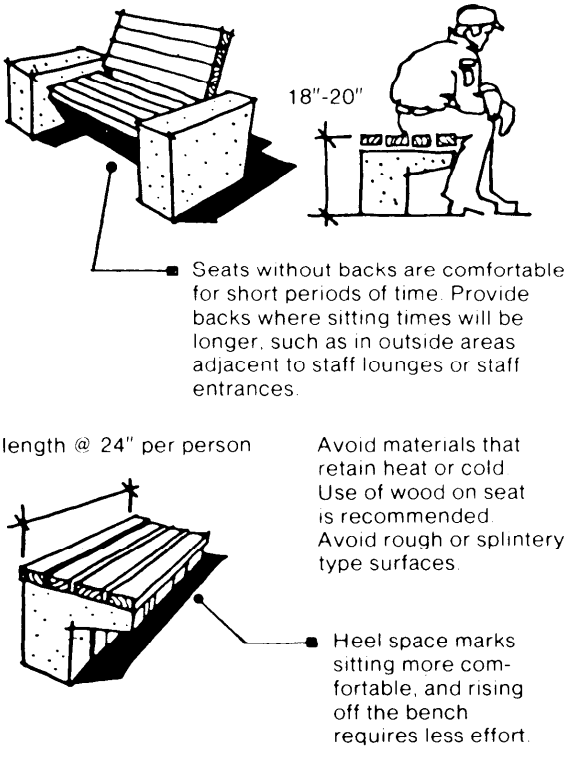
Figure 3-6 Site Signage Considerations



i. SIGNAGE The function of site signs at this facility is basically threefold: (1) to give IDENTIFICATION of the facility to those on adjacent streets; (2) to give DIRECTIONS to the various groups coming here: (3) to indicate the REGULATIONS of traffic vehicle movements on the site. Signs which are clear, easily read, and which present information with straight-forward simplicity are the most appropriate solutions for these functions. Choose lettering styles such as Helvetica, Univers, or Optima, which are read easily from a distance. Numbers and letters should be applied against a contrasting background for added readability. Materials and colors for signs should be matching or similar to those materials used in the building to present an image or coordinated development. Location of signs should be appropriate for the message they convey and should not be located where they might become an obstacle for pedestrians. Provide adequate lighting of signs for areas used at night.

j. SITE FURNITURE Design of other items of site furniture, such as benches, bollards handrails, flagpoles, trash receptacles, information or temporary outdoor structures, should be coordinated to represent a harmonious group of elements, with colors, shapes and general scale designed in sympathy with materials and forms used in the building. Elements of site furniture should be given a definite location and should not interfere with or obstruct general operational traffic patterns, pedestrian or vehicular circulation, and the general appearance of the site. It is recommended that, in addition to the required waste disposal equipment, moveable equipment such as trash receptacles be appropriately placed. The type selected should be aesthetically pleasing and should blend in with the landscaped setting. Refer to Figure 3-7 for guidance.

Figure 3-7 Site Furniture Considerations



k. SITE UTILITY SUPPORT Site utility support requirements for a military police facility may include such mechanical or service needs as the extension to the building of new or additional steam or hot water, electric power, water, and storm and sanitary sewer services wherever they are not already provided. Refer to more specific guidelines as contained in DOD 4270.1-M. Individual requirements for site utility support depend on the following needs:

(1) Heat If the installation is served by a central boiler plan, then the size of the plant and the distribution mains in the vicinity of the proposed site of the building should be checked for adequate spare capacity. In checking for spare capacity, the actual demand of the existing and new buildings should be estimated as accurately as possible, as very often the actual demand is as low as 65% of the design heat load. If spare capacity is not available in the boiler plant or in the distribution system, then modifications or additions to either the boiler plant or the distribution system should be considered.

(2) Electrical A survey of the appropriate portion of the existing system serving the installation will be made by local technical (Installation Facility Engineer) personnel to insure that adequate capacity for the proposed construction will be provided.

(3) Water The water distribution system should be checked for spare capacity to meet the requirements of the proposed building, including fire protection and whatever modifications must be made to the distribution system to serve the new building. Refer to technical manual TM 5-813-5 for more specific guidelines.

(4) Storm Drainage System The size and elevation of the storm sewers in the vicinity of the proposed location of the buildings should be checked. Proposed site grades and site drainage requirements should be coordinated with the existing storm drainage system to minimize the storm drainage work. If the existing storm drainage system is inadequate or non-existing, then grading plans should be developed to provide a surface drainage system to natural water courses.

(5) Sanitary Drainage System The size of the existing sanitary sewers should be checked if adequate to serve the proposed building. Extensions of, or modifications to, the existing system should be done in accordance with the guidelines in technical manual TM-5-814-1.

(6) Location Underground utility lines should not normally be located under roads, sidewalks, parking lots, paved terraces or other paved areas or areas of anticipated expansion, and should be located at the minimum depth necessary, usually not less than three feet.

3-3 Building Design Considerations

a. GENERAL There are many building design factors that determine architectural character and lead to the development of design criteria for military police facilities. The guidance provided in the following paragraphs outlines the principal design factors that influence the design of military police buildings. Table 3-2 provides a checklist of building design considerations.

Table 3-2: Building Design Considerations

- **(1) General**
  - (a) Basic Requirements
  - (b) Functional Characteristics
  - (c) Special Considerations
- **(2) Architectural Character**
  - (a) Basic Requirement
  - (b) Aesthetic Characteristics
  - (c) Design Elements
- **(3) Physical Expression**
  - (a) Operational Spaces
  - (b) Non-Operational Spaces
- **(4) Utility**
- **(5) Local Considerations**
- **(6) Physically Handicapped**
- **(7) Construction**
- **(8) Structural Design**
  - (a) Structural Systems
  - (b) System Selection
  - (c) Special Conditions
- **(9) Structural Module**
- **(10) Building System Flexibility**

(1) Basic Requirements In establishing design criteria, a clear distinction must always be made between the functional requirements of project environments such as locational and climatic factors and those fundamentally creative design characteristics that tend to enhance overall appearance of physical facilities. This guidance is particularly important to the development of an appropriate architectural character and aesthetic for law enforcement operations and facilities.

(2) Functional Characteristics In terms of conveying an appropriate architectural character, the design of military police facilities should reflect the overall functional characteristics of military police operations. Therefore, mission-peculiar operational requirements need special architectural attention. Existing general design criteria should be evaluated for appropriate application to the special conditions functions relating to operational activities. Care should be taken in the application of generalized design criteria to individual functional requirements, such as in the design of on-duty operations, facilities, special spaces and building components.

(3) Special Considerations Special design and construction criteria related to critical operations areas must be established prior to concept development in order to provide a firm basis for the accomplishment of a high level of quality in the architecture of military police facilities.

b. ARCHITECTURAL CHARACTER Emphasis should be placed on the fundamental importance of maintaining a consistent level of design quality and aesthetics in the architectural character of individual military police facilities. Recognizing this, the development of aesthetic concepts must clearly reflect both the generic and uniform functional requirements of individual military police activities.

(1) Basic Requirement The basic requirement that should govern the development of architectural character for individual projects is that building design should be used to visually convey a purposeful image for the law enforcement and community service functions housed by military police facilities.

(2) Aesthetic Characteristics The aesthetic characteristics of military police facilities should primarily reflect the seriousness and responsibility of law enforcement activities. In most cases, the public approach to the facility should convey a positive first impression, be Inviting and not Imposing in scale, and, without being overly somber, indicate that a military police facility is a place of serious work and genuine community assistance. Contrived or artificial details should be avoided. The use of straight-forward materials, a sympathetic relationship of form and structure to human scale, and the sensitive placement of strong and vibrant colors as an accent to a basically reserved color scheme should provide appropriate opportunities for individual expressions of the basic spirit and tenor of an important community activity. Great care and sensitivity must always be exercised to avoid whimsy in aesthetic expression. For found space projects, the aesthetics of existing barracks, mess halls, clubs, warehouses or other similar types of military service facilities will not, in terms of their present outward appearances, befitting for the military police. Some improvement will be necessary.

(3) Unification of Design Elements Unification of design elements is a basic aesthetic requirement that can be accomplished by setting an underlying physical, psychological and social tone in the design of the facility. Aesthetic concepts can be carried through in architectural forms and details that reflect a concern for human sensitivities and human scale. These are two primary concerns in unifying the aesthetics of a building and should be placed on an equal level with functional requirements as a determinator of the quality and form of architectural design. The overall sense of unity and scale in physical facilities should relate directly to the human perception of the functions that they either contain or support. For law enforcement facilities that depend on the maintenance of a positive public image, this is a particularly important consideration. Aesthetics must, therefore, influence functional planning and design decisions that establish the appropriate treatment of various site and building elements.

c. PHYSICAL EXPRESSION Military police facilities, for the most part, contain activities that are generally non-distinctive in their physical form. With theexception of the MP Desk area, which is usually an interior space, these spaces have the same basic floor-to-ceiling dimensions and the same roof support and basic enclosure requirement. However, individual operational activities and non-operational spaces may have special functional requirements that can be expressed architecturally. The need for natural light, outside awareness, privacy, security, etc. should be the basis for physical expression. Other factors, such as local architectural traditions, the need to achieve aesthetic unity, and the need to create as barrier-free an environment as possible for the physically handicapped, should be considered in developing an appropriate physical expression for military police facilities.

(1) Operational Spaces Although On-Duty operational areas have space requirements which are essentially function-oriented, there may be unique opportunities for the physical expression of basic requirements. For example, activities such as those at or near the MP Desk: communications, briefing, prisoner-processing, or specialized interview or report-writing rooms, might be manned or in some way occupied on a 24-hour basis. This staffing pattern might necessitate the need for outside awareness, which could be satisfied by limiting fenestration to skylights. This would provide a more perfectly controlled environment and would also provide a more secure area. If critical or confidential operational activities are required. Other physical elements might be used to express functional requirements in a way that would give relief from what might otherwise become an unimpressive exterior wall treatment. Similar function-based opportunities for physical expression exist for other building forms, such as entrances or roof lines

(2) Non-Operational Spaces Non-operational spaces, that is, building elements used to achieve the proper organization or physical and functional requirements, could be expressed as distinct building forms. Entrances, corridors, lobbies, vertical circulation, mechanical cores and other building elements can also give clarity and identity to the external expresston of internal function, provide interest by varying the volume and character of enclosures and the play of light and shadow, and can be used to emphasize the main points of access. An expression of functional requirements contributes to aesthetic

and functional clarity, the visual comprehension of activities, and the general approachability of military police facilities. The use of physical expression in non-operational spaces can relieve the sense of rigidity that might otherwise be conveyed by more passive approaches to design.

d. UTILITY Utility in the design of exterior building systems and the selection of sub-system materials should be based on such factors as suitability, economy of first cost and life cycle costs, and energy and natural resource conservation. Window expanses should be avoided where operational security is a significant factor. Extensive glazing should also be avoided in unusually sunny climates to prevent undue solar heat gain, and in frigid areas to prevent heat loss, both of which result in increased operating costs. The durability of basic building materials for permanent constructron is paramount. Nothing could be more destructive to the image of efficiency and effectiveness required by military police activities than to have a new building that has a design life of over thirty years look dated in ten. High standards of utility, simplicity and directness of form and materials are recommended as the most effective way to avoid the pitfalls of obsolescent design. This approach does not imply simple-mindedness; on the contrary, it requires the greatest skill on the part of the design team, from pre-planning decisions through construction supervision to building occupancy. The long-term operations and maintenance factors of building systems and materials must be carefully considered.

e. LOCAL CONSIDERATIONS Local architectural traditions and indigenous materials will influence, to a certain extent, the aesthetic decisions related to military police facilities. They should not, however, be the controlling consideration. The design should not inappropriately reflect historic patterns of aesthetic expression. Respect for neighboring facilities of historic importance should be maintained by the use of sympathetic texture, color, and, where possible, scale. Climatic conditions will also Influence the final design and will have their greatest effect on specific building forms and on the characteristics of specific building materials.

f. PHYSICALLY HANDICAPPED The design of facilities for military police operations and administrative support activities must contain provisions to make such facilities accessible to and usable by the physically handicapped. This requirement will be accomplished in accordance with the detailed guidance contained in DOD Construction Criteria Manual 4270.1-M, EM 1110-1-103 and ER 1110-1-102 as well as specific criteria referred to in this guide.

g. CONSTRUCTION Reference should be made to DOD Constructron Criteria Manual 4270.1-M, and OCE instructions titled "Life Cycle Costing, Economic Studies in Connection with the Design of Military Construction Projects," dated 3 May 1971, revisions dated 27 September 1971, 3 March 1972, 12 July 1972, 1 October 1973 and 5 February 1974. A specific fire protection requirement of all projects shall be that on-duty operations areas be so constructed that a two-hour fire rating can be obtained. Also, sites where a deficit in PF 100 fallout shelter space exists under the Army Survival Measures Plan, selected areas of the structure should be designed for dual use as fallout shelters, with an estimated cost to provide the shelter not exceeding one percent of the structure's cost. For more detailed requirements on fallout shelters see TM 5-800-1 and current change thereto. Fire protection ratings as defined in DOD Construction Criteria Manual 4270.1-M must be considered in planning all types of construction.

h. STRUCTURAL DESIGN Structural design load and criteria should be in accordance with DOD Construction Criteria Manual 4270.1-M, TM 5-809-1 thru 6, 8, 9, and 11 as applicable. Seismic design should be in accordance with TM 5-809-10. The following factors are the principal considerations in identifying a structural design for military police facilities which are appropriate to local considerations.

(1) Structural Systems Although variations exist in each, there are two basic structural systems that are appropriate for military police facilities:

(a) Steel Frame This system offers a wide range of sub-system components, which are mass produced and shipped to the construction site for assembly, e.g., (floor and roof deck systems, open-web bar joists, and, to satisfy column-free space requirements, pre-engineered and pre-fabricated space frames.

(b) Reinforced Concrete This system includes poured-in-place concrete and plant pre-cast and prestressed concrete structural components. Recent developments in form work, placement, and in higher strength reinforcing steel and concrete have reduced the cost of reinforced concrete structural systems. It is unlikely that concrete will prove economically feasible for single-story buildings except for those areas where two-hour fire rating is mandatory.

(2) Structural System Selection The selection of an appropriate structural system must be based on comparative cost studies that determine the most economical system for the characteristics of a particular project environment. Special conditions such as heavier-than-normal floor live loads or seismic design requirements will have an impact on system selection.

(3) Special Conditions When special structural conditions are imposed by site constraints that present requirements for a facility of more than two stories including a basement, a reinforced concrete structural system may be indicated by comparative cost studies. Consideration should be given to a concrete structural system for 1 and 2 stories using

Grade 60 reinforcing bars to reduce field labor costs and concrete in excess of 5,000 lbs. per square inch where the functional requirements for change are such that a steel frame system would be overly constrained by new concentrations of personnel, equipment or functional activities. Physical flexibility need not be inhibited by limitations on the location of essential operations imposed by the initial design of lightweight steel frame systems since increased loads or changes in concentration are more appropriately and economically treated as "built-in" conditions in the design of reinforced concrete.

i. STRUCTURAL MODULE The structural module, or grid, should be a multiple of the basic planning grid. Comparative cost studies should be made of the most apparent competitive systems, recognizing that the larger economical bay sizes provide greater flexibility for functional layout. The studies must take into account the mechanical and electrical systems and their cost implications presented by the varying structural systems. For example, the increased depth of main girders will increase the floor-to-floor heights to allow for "straight-run" duct work, which is the most economical method of air distribution. The increase of floor-to-floor heights correspondingly increases building costs due to expanded exterior materials.

j. BUILDING SYSTEM FLEXIBILITY The need for building system flexibility will be a principal determinate of building form and structure, and will govern the specification of building sub-systems, such as floors, walls, partitions, and ceilings. For example, to accommodate power and communications requirements economically, particularly where the flexibility in arrangements of large open office areas is essential, consideration must be given to the provision of a structural cellular floor deck, which provides necessary duct space in lieu of a more expensive underfloor duct system.

3-4
Interior Design Considerations

a. GENERAL Interior design features shall be developed in conjunction with the architectural design and coordinated with future planning and design requirements. All features of the building relative to the interior design, whether they arefurnished and installed as part

Table 3-3: Interior Design Considerations

Items	Concerns
(1) General	Overall Scheme; Interior Design; Architectural Design; Future Planning and Design; Functional Effectiveness
(a) Cost Estimates	Equipment; Partitions, Lighting, Work Surfaces; Floors, Walls, Ceilings, Window Treatments; Color, Graphics; Planting
(b) Mandatory Sources	Accuracy, Currency; Professional Design Guidance
(c) Presentation Format	Clarity; Organization; Coordination
(2) Partitions	
(a) Permanent	
Fixed	Need For: Fixed Location, Minimal Change, Stability of Requirements; Fire-Rated Secure Areas
Semi-Fixed	Need For: Moderate Change, Relatively Stable, Acoustic and Visual Separation
Demountable	Need For: Maximum Anticipated Change, Minimal Separation; Minimize Operation and Maintenance Costs
Space Dividers	Space Definition; Privacy; Acoustical Separation; Task Lighting
(b) Non-Permanent	
Modular/Movable	Functional Requirements, Frequency of Change; Durability, Lighting and Electrical Outlets
Temporary	Separation of Work Areas; Flexibility; Acoustic Privacy; Space Organization
(3) Ceilings	Physical, Functional, Environmental Requirements; Economy; Effectiveness; Maintenance; Lighting; Building Module
(a) Standard	Building Module; Planning Module
(b) Special	Task Lighting; Acoustic Isolation; Building Module
(4) Floor Finishes	
(a) Resilient Tile	Economy; Utility
(b) Carpet	Acoustics; Anti-Static; Habitability; Functional Effectiveness
(c) Ceramic Tile	Toilet Rooms; Detention Facilities; Shower and Locker Rooms
(5) Material-Color Selection	Individual Requirements; Overall Design Concept
(a) General	Maintenance; Anticipated Change; Life Cycle Cost; Security, Safety; Acoustics; Appropriateness to Functional Activity
(b) Color	Physical and Psychological Effectiveness; Functional Requirements; Image and Operational Suitability
(c) Finish Materials	Design Coordination; Image; Architectural Character; Aesthetics; Durability; Installation and Maintenance Costs
(6) Signage and Graphics	Design Coordination, Economy, Ease of Procurement, Installation, Standardization; Maintenance; Flexibility
(a) Message Format	Comprehension; Suitability; Lighting; Changeability; Maintenance
(b) Facility Identifiers	Location; Building Number, Principal Functions, Activity Hours; Restricted Areas; General Directions
(c) Pictographs	Simplicity; Economy; Multi-Lingual Communication
(d) Space Identifiers	Words, Numbers Required
(e) Directional Signs	Circulation Control; Functional Integrity; Restricted Access; Privacy; Confidentiality; Security
(f) Display Boards	Operations Control; Patrol Coordination; Dispatch of Military Police Services and Assistance
(g) Notice Boards	Information Control, Accommodate Change in Information
(7) Unique Requirements	
(a) CCTV Monitoring	
(b) Security Systems	
(c) MP Desk Equipment	
(d) Built-In Furniture	MP Desk Area; Prisoner-Processing and Detention Area; Operations Office
(e) Detention Facilities	

of the construction contract or later provided by the using service, will be developed as an overall scheme. Table 3-3 provides a checklist of interior design items and concerns which should be considered in identifying and evaluating interior design requirements. Generally, form, color, the material of interior furnishings and finishes, space partitions, graphic design and signage will be introduced as part of the overall design to give visual distinction to activities and to facilitate functional effectiveness. Project-specific requirements for interior design shall be coordinated with the using service and the installation and shall reflect a consideration of:

(1) Cost Estimates When estimating the cost of interior design requirements, all items of equipment and furnishings which are permanently built-in or attached to the structure, as defined in AR 415-17, are normally considered part of the construction contract. Other items which are loose, portable or can be detached from the structure without tools, are generally provided by the using service under separate contract. Interior building surfaces, paint colors, floor coverings, window coverings as required, graphics and signage will be specified as part of the construction contract in coordination with the overall design. Furniture shall be identified for procurement by others.

(2) Mandatory Sources Sources for selection and procurement of furnishings are listed in the GSA periodical listing of National and Regional Federal Supply Schedules, The Federal Prison Industries Schedule of Products and the general GSA Supply Catalog. Procurement by the using servicefrom these sources is mandatory, provided that the items available meet requirements. For items not listed in the mandatory sources above but which are part of the overall design scheme, appropriate guidance shall be provided by the designer for procurement by the using service. Mandatory source schedules and catalogs must be carefully reviewed to determine the accuracy and currency of price and material specification data as they may change frequently to reflect cost changes and additions or deletions of contract items. New items will be found under new item introductory schedules (NIIS) in the periodical listing mentioned above.

(3) Format Requirements Drawings and schedules concerning items not included in the construction must be provided in a format that can be readily issued to and be understood by installation personnel who are responsible for procurement, and personnel who are responsible for component placement and utilization after delivery. Display sheets consisting of placement plans, catalog illustrations, material/color samples and perspective sketches of typical spaces, together with procurement lists, source data, and cost estimates will be developed as appropriate to accomplish this objective. Direct coordination between these drawings and schedules, and the finish schedules under the construction contract must not only be evident, but clearly organized to allow direct design evaluation.

b. PARTITIONS Spaces are typically defined by the use of partitions. Individual functions may be further defined and specific requirements related to a particular activity satisfied by enclosures which meet the specified planning and design criteria. The following guidance will govern the specification and use of partitions in military police facilities.

(1) Permanent Partition Types The following partition systems are used in permanent construction:

(a) Fixed These are usually of masonry construction and are used in areas where change is not anticipated, such as stairways, mechanical and toilet rooms, the lobby/reception areas, on-duty desk areas, secure records storage, evidence and property storage, operational equipment, arms and ammunition storage, and for other permanent or fire-rated areas.

(b) Semi-fixed These are rated or non-rated partitions, used where little change is anticipated during the life of the facility. The most common type of construction and the most economical is gypsum board on steel stud. Partitions penetrate the ceiling and extend to the underside of the structure above. Additional layers of gypsum board and acoustical material between the studs will achieve the desired sound attenuation and/or fire rating.

(c) Demountable This is a type of partition usually of gypsum board and steel stud construction and similar to semi-fixed but extending only to the underside of ceilings. It is used where anticipated change is measured in years rather than in months. These partitions can be demounted and the studs, floor and ceiling channels, doors, frames and hardware reused as salvageable components.

(d) Space Dividers These are free-standing partitions, used to define and acoustically separate but not physically isolate or completely enclose individual functional activity areas. Where a permanent functional requirement for such dividers is essential to effective operations, this requirement should be included in the permanent construction contract. For example, in the provision of medium privacy and acoustic isolation in open administrative or operational areas. Also, where maximum flexibility is required or a change in operational or organizational requirements is probable, a functional requirement of temporary space dividers may be included in the permanent construction contract. Refer to criteria governing the use of acoustically treated space dividers contained in mandatory sources documents.

(2) Non-Permanent Partition Types The following are typical non-permanent partition systems:

(a) Modular/Relocatable These are prefabricated modular type wall components designed for individ-

ual activities areas Layouts of this type of partition system are usually based on the planning module. Modular/Relocatable partitions can be field assembled and normally consist of ceiling height, door height, or low bank screen modules. This type of partition should be used only for individual functional activities where frequent change is anticipated and the need for flexibility can be justified; this is usually in MP operations areas.

(6) Temporary Space Dividers Low, free-standing cubical-type units used to define individual work areas. This type of partition system is often used on open office planning where individual units are frequently acoustically treated to lower noise levels. In most instances, this type of partition system is properly included as part of the furniture to be procured by the using service rather than part of the permanent constructron contract. Specific requirements, such as space organization principles – open office or landscape off ice planning – or the special needs of individual work stations for flexibility, acoustic privacy, etc., may indicate that space dividers are essential to operational and mission effectiveness and thus they may be considered as permanent construction items.

c. CEILINGS The interior design requirements for ceilings and ceiling systems depend on the physical functional and environmental requirements of individual activity areas. The choices of color, material and surface finish, as well as system components, should assure maximum economy and functional effectiveness. The choice of an appropriate ceiling system must reflect a consideration for spatial and environmental services flexibility and long-term operational and maintenance requirements. Suspended ceiling systems require either the use of recessed lighting fixtures which are integrated into the design of the ceiling, or independent lighting systems. Requirements for the design of ceilings often depend on concepts for providing direct and indirect light to various work surfaces and work areas. Where individual tasks are to be lighted by separate lighting systems, which will be either integrated with or independent of work station furniture, and where open office areas constitute the majority of space requirements, the type of ceiling selected will not affect the design of interior lighting systems. For conventional ceiling-oriented lighting systems, the type of ceiling selected will affect the decision as to the exact fixture selected. If a standard ceiling is used, the lighting fixture should be planned on a module of the building for ease in installation. The principal types of ceilings used in military police facilities are:

(1) Standard Suspended lay-in acoustical tile with exposed grid is the standard requirement. The standard grid of 2” by 4” is the most economical system. It allows for installation of standard recesses, 2” x 4” lighting fixtures and easy installation of ceiling diffusers and grills for HVAC, and provides access to services above. Unless special considerations dictate otherwise, this system would be the logical choice as a facility standard for ceilings.

(2) Special A solid wire-mesh reinforced ceiling is required for arms storage, mail/message center, detention areas, operational equipment storage and for evidence and property storage areas.

d. FLOOR FINISHES The following typical floor treatments should be considered in the design of individual military police facilities.

(1) Resilient Tile Consideration should be given to the use of vinyl asbestos resilient tile as a primary floor finish throughout the facility for the reasons of economy and utility.

(2) Carpet This floor finish is to be used in special areas where functionally deemed appropriate, such as in large open office areas where additional acoustical treatment is a critical requirement. Administrative support areas (MIS,WPC, etc.) require anti-static carpet.

(3) Ceramic Tile To be used primarily in toilet rooms. Quarry tile or similar hard finish tile should be used in detention facilities to enhance the humane quality of space that may require 24-hour occupancy.

e. MATERIAL-COLOR SELECTION The material and color of interior design elements must reflect Individual requirements and be coordinated with the overall design concept for activity areas and the entire building. In selecting proper materials and colors, consider the following.

(1) General Interior finishes shall be appropriate for the designed function of the building and spaces Selection of materials should be based on low maintenance qualities considering the anticipated use, the impact on life cycle cost and the requirements for security as well as health, fire, and other safety requirements. Decisions concerning the use of carpets as an interior finish other than for floors will be coordinated with the using service and should be based on distinct functional advantages, such as its acoustic, safety and maintenance properties.

(2) Color Use of color in Army facilities is limited to a practical number selected from Federal Standard 595A: Colors. General guidance for color selection is provided in TM 5-807-7 Colors for Buildings. Color should be used to stimulate human physical and emotional reactions and to enhance the overall functionalism of the facility. Use neutral base colors in office areas and consider brighter base colors and accents in casual seeing spaces in critical seeing areas, glare, brilliant colors and great brightness differences, both in the lighting system and in the color of walls, floors, furnishings, and equipment, should be avoided.

(3) Finish Materials Finish materials must be selected in conjunction with color selection. The color, texture and pattern of materials should complement the overall design scheme and be in character with the desired image of the using service and the installation/command. Native (local) materials should be used to the greatest extent practicable, consistent with the architectural character of criminal investigation facilities. Long-life materials such as masonry, tiles and woods, should be selected to provide attractive accent colors, textures and patterns that will not quickly become out-dated. Painted surfaces and patterns are relatively easy and inexpensive to refinish and can be kept fresh, clean, and up-to-date in appearance.

f. SIGNAGE AND GRAPHICS Interior signage and graphics requirements will be specified as part of the overall facility design. Detailed requirements of the using service will be coordinated at the local level. The graphic information systems should assure maximum economy, ease of procurement and installation, and standardization of application throughout the facility. Design details should inhibit vandalism and excessive maintenance but be flexible enough to enable the addition of or deletion of information. The signage system should Incorporate the following types of signs.

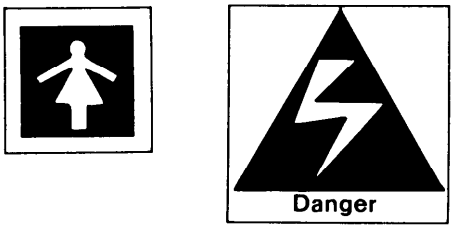
(1) Message Format The use of wall graphics and symbols instead of words should be considered to establishing the message format of signage and graphics systems. The usefulness of symbols as an element in the graphics format has been established in this country and internationally. They cut down on the amount of signage required and are easier to "read" In the case of prohibition signs (“No Smoking” or ‘No Entry”), symbols cause less resentment or opposition than if the message had been in words. Where words are required, use a type style such as Helvetica Medium individual letter sizes are designated by the height of the capital letters. Typical uses are 1" for registers and general information signs, and 2" for directional and Identification signs and any signs where background lines are 3" apart. Four inch lettering should be used where the background lines are 6” apart. Signs should be located as close to eye-level as possible and should be Illuminated to provide adequate comprehension, either by room lighting or by special sign lighting avoiding reflection glare.

(2) Facility and Activity Identifiers A facility identification sign should be located along major vehicular access routes and pedestrian pathways and should be oriented toward the principal flow of pedestrian traffic. The sign should identify the building number and the functions of the facility. It may also indicate the function by use of using service symbol or insignia. General information may include a listing of principal activities and hours of center operation. Size of lettering and the exact location of the sign should be determined in each individual case in relation to the architectural design. Four inch lettering on 6" panels or 2" lettering on 3" panels, similarly used as discussed under “Identification Signs” below, is recommended. Low horizontal activity Identification signs, using 2" lettering on a 4" panel, placed a maximum of 12" from the ground, should be used at visitor access points and other places where the control of site circulation is essential. Signs identifying restricted areas, or "visitor parking", etc. should also Indicate the proper direction. Where day and night activities require clear identification and directional information, facility and activity Identification signs should be well lighted. Refer to Figure 3-8 for guidance.

Figure 3-8 Facility and Activity Identifier Signs

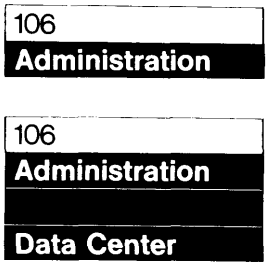
(3) Pictographs or Symbol-Signs There is no more simple, more direct or economical way to convey certain forms of information than by use of symbols or pictographs. This is particularly important where clear multi-lingual communication is essential. In such cases, use symbol-sign panels approximately 6" square for most Identification purposes, on doors only (toilets, phones, utility rooms, stairs, etc.). Use sign panels approximately 12" square for prohibitory signs ("No Entry," "No Smoking," etc.). The location of exits, fire protection and other safety equipment should be strongly emphasized as appropriate Figure 3-9 indicates typical symbol-signs

Figure 3-9 Typical Symbol-Signs



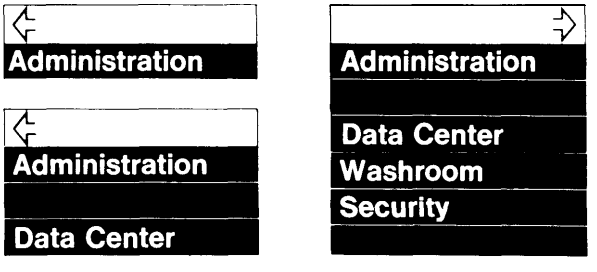
(4) Space Identification Signs When words and numbers are required as part of an individual space identification, use sign panels approximately 3" by 24" on the wall next to entrance doors and on the side adjacent to the opening swing of the door. A white letter form on background is recommended where words are required. The number of 3" by 24" sign panels for each space will depend upon how much information must be displayed Refer to Figure 3-10 for guidance.

Figure 3-10 Space Identification Signs



(5) Directional Signs These signs can make use of the same sign panels as recommended under identification. Signs Refer to Figure 3-11 for guidance.

Figure 3-11 Directional Signs



(6) Activity Locator Boards The primary purpose of activity locator boards is to assist in the control, administration and dispatch of military police services. The design of individual activity locator boards should be coordinated with the using service. Generally these boards are of two types: Operations Boards and Administration Boards Operations Boards will be located in the Operations Office and at the On-duty military police desk and will be of a size and sophistication capable of meeting specific operational requirements. The On-duty desk board will be large enough to display the map of the installation and should have space for the visual display of satellited activity areas. These boards may be electrified to facilitate the use of illuminated locating systems. In all cases, activity locator boards should be well lighted In general, activity locator boards require a large horizontal wall space, usually 8'-10' in length.

(7) Notice Boards Notice boards help control clutter and can readily accommodate changing Information. They should be used throughout the building wherever they will be most useful.. A general notice board should be located in the entrance to the facility. Smaller boards may be located next to entrances to functional activity areas where there is need for exclusive notices that elaborate on a specific type of activity, such as duty rosters or personnel notices, or give names of participants or staff involved in special details or on TDY, etc. Simple notice boards can be created by providing a 2 to 6 foot wide field of a solid base color mounted at the 7' level with a 6" white space above for the word, "Notices" in 4" lettering, One or two narrow cork strips attached at the 6' and 4' levels should be provided for thumb tacking notices.

g. UNIQUE REQUIREMENTS The local using service must specify unique or special interior design requirements. The following are typical items that require special interior design consideration.

(1) CCTV monitoring systems
(2) Security systems (Reference appropriate surveillance and intrusion detection regulations). Required for Operational Equipment (Arms & Evidence) Storage
(3) Special communications equipment as required and specified by the using service
(4) Special police operations equipment as required
(5) On-duty desk area built-in furniture
(6) Prisoner-processing equipment and detention facilities as required.

3-5 Interior Furniture and Equipment

a. REQUIREMENTS Using service requirements for movable or non-permanent equipment and furnishings must be based on the 1391 estimate and Project Development Brochure completed during planning, as discussed under Paragraph 2-3 "Facility Development." All items of equipment and furnishings which are permanently built-in or attached to the structure as defined in AR 415-17, are considered part of the building. Other items which are loose, portable, or can be detached from the structure without tools are generally provided by the using service under separate contract Items appropriate for individual spaces are identified under individual space criteria. During final selection, preliminary schedules should be reviewed carefully, coordinated again with the local using service, and verified against the latest mandatory source catalogs

b. SELECTION FACTORS The following principal factors should be considered by the using service. In selecting appropriate furniture and equipment for facilities

(1) Appearance Furniture and equipment must be an integral part of the overall building design and should be closely coordinated with the selection of colors and finish materials for consistency in appearance quality. Clear relationship between the furnishings finish schedule and the building finish materials should be evident.

(2) Durability, Comfort and Safety Careful attention must be given to all interior furnishings to insure that the type of furniture and equipment chosen conforms to standards of durability, comfort, and safety appropriate for the use they will receive. Being generally mobile, these items are subject to handling. Parts that receive the most wear should be replaceable, and finishes should sustain regular cleaning, Colors, textures, sizes, proportions, shapes and reflections are important comfort factors that should be considered. Furniture and equipment must withstand loading conditions without damage. Edges and surfaces should be smooth and rounded. Materials must be flame-retardant.

(3) Mobility and Interchangeability Most Interior furnishings should not be of a scale which would require more than two persons to relocate them, or be so complicated as to require an undue amount of time to assemble or disassemble. Whenever possible, care should be taken to choose multi-purpose furnishings aesthetically suitable for a variety of needs and activities. Stackable and foldable furniture should be considered for reducing bulkiness in storage and transport where such requirements exist.

13-6 Provision of User Information

a. COMPLETION RECORDS In order to gain maximum effectiveness in using the facility, the using service should be provided with a supplement to the completion records required by AR 415-10. This supplement should contain Information on how to best utilize the facility based on standard operating procedures, performance criteria and intent of design for the principal elements of each individual project. It should also include information on related maintenance and operational factors covered in the completion records. Information should be provided in a form that facilitates understanding and use by the using service as well as Facilities Engineer personnel. Material should be included to cover major design intentions for the utilization of interior spaces and built-in design features in conjunction with furnishings and equipment schedules. In addition, AR 415-10 requirements include the following documents and records which must be submitted to the using service upon completion of the project.

(1) Contract documents, cost data, and other pertinent information required for accountability records.

(2) Manufacturer's catalogs, maintenance and operating manuals, and other Instructions. These items will be made available as soon as possible, but not later than the date upon which maintenance and operational responsibilities are transferred to the using groups.

(3) Equipment guarantees by the contractor, subcontractors, and material vendors.

(4) Copies of wiring diagrams, records, maps and complete, legible, as-built drawings and specifications, corrected to show all changes from the originals, including supporting utilities.

(5) Specialized keys, handles and tools required for operation of building equipment and systems.

b. DRAWINGS AND SCHEDULES Floor plans, intenor design and furniture and equipment schedules must indicate items which are part of the building and cannot be removed, and those that are detached and can be removed or may remain with the building if relocation becomes necessary. Removable items must be procured by the using service. This usually requires color coding of equipment and furniture according to type and functional use. A specific color should be used for items procured under separate using service contract. All items must be color coded and presented in a format and schedule that can be readily understood by installation or using service personnel who are responsible for component placement and utilization

after delivery. Display sheets consisting of placement plans, catalog illustrations, material/color samples and perspective sketches of typical spaces, together with procurement lists, equipment schedules, color coding, source data and cost estimates should be developed as appropriate to accomplish this objective.

3-7 Environmental Services

a. GENERAL There are five separate habitability support systems: heating, ventilation air conditioning, plumbing and electrical sub-systems. Since these systems interact with each other the layout of requirements must be integrated to produce a total environmental services design. This design must be coordinated with architectural-, structural-, and site-planning and design requirements. The correlation of the design of each of the environmental services should be done at all stages of the design of the building. This is particularly important to the proper selection of the various building components related to each sub-system (HVAC, plumbing and electrical). For example, in the selection of a ceiling system, the acoustic, lighting and air conditioning requirements must beconsidered; in the selection of a structural system, the capabilities of the system for providing required electrical and telephone service to general offices should be considered. The importance of this aspect of the design of the environmental services for a particular building cannot be overemphasized if the building is to function as an integrated unit. The items contained in Table 3-4, provide a checklist of environ mental services design considerations and should be reviewed for individual projects to assure that all important design factors have been considered.

b. OBSOLESCENCE In the selection of any com-

Table 3-4: Environmental Services Design Considerations

Items	Concerns
(1) General	Coordination of Sub-System Design; Coordination with Architectural, Structural, Site-Planning Components
(2) Obsolescence	Design Performance; Life Cycle Costs; Operational Flexibility
(3) Life Cycle Cost	Initial Installed Cost; Operating Costs; Maintenance Cost; Energy Cost; Replacement Costs
(4) Expansion	Space Requirements Cost; Design; Necessity; Timing
(5) Building Sub-Systems	HVAC; Electrical; Special Equipment; Plumbing
(a) Design Criteria	Functional Requirements; Habitability; Safety; Efficiency; Economy; Life Cycle Costs; System Value
(b) Weather Zones	Inside Temperature, Humidity, Climatic Conditions
(c) Comfort Conditions	Near Building Perimeter, Core and Circulation Areas; General Humidity Inside Buildings; Special Requirements
(6) Heating	
(a) Cabinet Heaters	Entrances; Lobbies; Stairs with Exterior Walls; Mechanical Equipment Rooms; Outdoor Design Temperature
(b) Snow Removal	Heavy Accumulation; Major Entrances, Operational Areas; Overhangs
(7) Ventilation	Natural vs. Mechanical
(a) Requirements	Functional Effectiveness; Odor Removal; Comfort Conditions; Safety
(b) Special Conditions	Air Conditioning; Odor Removal; Heat
(8) Air Conditioning	Outside Temperature Conditions; Solar Heat Gain; Internal Heat Gains; Functional Requirements
(a) Room Units	Expense; Water Control
(b) Central Air Systems Low Pressure Multi-Zone High-Pressure, Single High-Pressure, Dual	Expense; Cooling, Dehumidification, Ventilation of all Building Spaces
(9) Operational Requirements	
(a) Noise	Quality of Operations; Mission-Effectiveness; Habitability; Function
(b) Acoustic Security	Confidentiality; Comfort; Functional Requirements
(c) Temperature Control	Comfort; Economy; Functional Requirements
(d) Humidity Control	Comfort; Economy; Functional Requirements
(10) System Selection	
(a) Perimeter System	Winter Heating, Summer Cooling; Physical Need; Functional Requirements
(b) Interior System	Year-Round Cooling; Size of System; Number of Zones; Noise Considerations; Permanence of Zones
(11) Designing for Flexibility	Change; Expansion
(a) Most Flexible	Life-Cycle Economy; Probability of Change in Size, Mission and Function
(b) Less Flexible	Stability, Durability and Permanence of Function, Equipment and Facilities
(12) Mechanical Equipment	Proximity, Accessibility; Vibration, Noise Control; Efficiency; Economy and Life Cycle Costs
(13) Electrical	
(a) Electrical Service	Building Size; Needed Capacity
(b) Electrical System	
(c) Distribution System	Functional Activities Requirements; Flexibility; Probability of Change
(d) Emergency Power	
(e) Auxiliary Support Power	
(f) Special Requirements	
(g) Exterior	Site Planning, Landscaping, Coordination; Accessibility; Safety, Ease of Maintenance
(14) Special Equipment	
(a) Security Equipment	
(b) Communication System	Telephone
(c) Recessed Conduits	
(d) Fire and Safety	
(e) Smoke Detection	
(f) Fire and Smoke Control	
(15) Plumbing, Waste, Service	
(a) Hot, Cold Water	Toilets, Lavatories; Drinking Fountains; Kitchen Units
(b) Water Heaters	
(c) Sanitary Drainage	Relationship Between Sewer Lines and Facility Services; Cost
(d) Storm/Water Drainage	

ponent of a sub-system consider the long-term implications for obsolescence as they affect performance and cost. For example, a roof-top air conditioning unit has relatively low initial cost compared with other systems, but an expected useful life of only 15 years, after which time it will probably require extensive repair or replacement. Thus, over the life of the building, the comparatively shorter useful life of a sub-system might offset the initial cost advantage.

c. LIFE CYCLE COST In addition to obsolescence, the total life cycle or operating cost of the major components of environmental services sub-systems must be considered. This total cost comprises the initial installed cost, the maintenance cost and the energy cost of the component over its useful life. For example, if it is known that the initial installed cost of large refrigeration equipment using air-cooled condensers is less than the initial installed cost of refrigeration equipment using water-cooled condensers, but the energy cost of equipment using air-cooled condensers is substantially higher; then the total owning and operating costs (the life cycle cost) would generally be higher for air-cooled refrigeration equipment. Invariably, large refrigeration equipment will employ water-cooled condensers unless other factors govern the selection of major sub-system components, such as a lack of makeup water, etc.

d. EXPANSION In designing environmental services sub-systems, consider the need for future expansion of each sub-system due to expansion of the building. Solutions may involve providing spare capacity when expansion of the building in the near future is probable. Also, the provision of space for additional equipment for possible extension of the building in the longer-term future should be considered. Nothing in thedesign of any environmental services sub-system should preclude the replacement or relocation of equipment when extension of the building has been definitely projected. Such provisions for future expansion always result in an increase in costs. The need for and timing of expansion should be carefully evaluated before a decision is made to program for it in order to justify the additional costs involved. Another possibility is to provide for incremental growth by requiring any future expansion to be accomplished by constructing fully serviced modules with their own environmental systems. In this particular case, although the initial building construction programs may be left unaffected, the site utilities requirements must include or permit provisions for modular expansion of environmental services.

3-8 Environmental Service Sub-Systems

a. GENERAL Environmental services are divided into three major sub-systems: heating, ventilating and air-conditioning (HVAC); plumbing; and electrical. The following descriptions of each sub-system are intended to familiarize the non-technical user with various criteria involved in sub-system selection and design, and to provide guidance to the engineer and architect.

b. HVAC The heating, ventilating, and air conditioning system for a building is generally concerned with providing a comfortable interior climate. While the technical meaning of the word “air conditioning” includes heating and ventilating, it is commonly used as a synonym for cooling. It is used both ways here, depending on the context. For standard applications, refer to DOD Construction Criteria Manual 4270.1-M and to Technical Manual TM 5-810-5.

(1) Weather Zones Refer to DOD Manual 4270.1-M for definitions of weather zones, inside temperature and humidity to be maintained, and, under Programming Priorities, whether or not military police buildings are to be provided with comfort cooling systems. The number of hours of wet bulb and dry bulb for the site will be obtained from Technical Manual TM 5-785, “Engineering Weather Data.”

(2) Comfort Conditions In order to get comfortable temperature conditions close to windows, and in order to maintain comfortable humidity levels inside the building, consider the use of double glass or storm sash in buildings located in cold weather zones. Wherever a building is to be air conditioned (cooled), consider tinted glass, double glazing, and/or storm windows, thus reducing the size, initial cost and operating cost of the air conditioning system. As a protection against over-dependency on artificial systems in critical operational areas, well-sealed, operable windows should be provided, especially in all exterior spaces under 160 square feet.

c. HEATING The heating is usually provided by hot water obtained from a central heating plant on the installation or from a boiler in the building. If the installation has either a central steam or high temperature water system, heat exchangers should be provided in the building to heat water that can then be pumped to the various areas of the building.

(1) Cabinet Heaters Fan-type unit heaters should be provided at all entrances and in all lobbies, stairs with exterior walls, mechanical equipment rooms and other such areas requiring heat. Cabinet heaters will not be provided where outdoor design temperature is +20 degrees F or higher. Whenever a large group of people enters or leaves a building, both the inner and outer doors of the vestibule are open and large amounts of cold air enter the lobby. Thus, wherever a lobby has a vestibule, a cabinet-type unit heater in the lobby is to be preferred to one in the vestibule for quick recovery and more stable lobby conditions.

(2) Snow Removal In areas where heavy snow accumulations are anticipated, consider the use of a snow-melting system for all major visitor/staff and on-duty entrances and operational areas and for overhangs above covered guard mount areas.

d. VENTILATION The ventilation system for a building can be achieved either by natural ventilation or by mechanical ventilation While natural ventilation (operable windows) is always preferable, it leads to such great restrictions in the efficient use of space that it is not a significant factor in the design of the building. Mechanical ventilation Includes the supply, exhaust, and recirculation of air either by separate or combined systems or both. Typically, an air-handling unit will pull in fresh outside air, filter, cool or heat it, and deliver it via ductwork to various spaces. The suction power of the air-handling unit, aided by the pressure buildup in the various spaces, also acts to draw air out of the various spaces and, through modulating dampers, exhaust all or part of this air to the outside and return the rest to the unit. Return air mixes with fresh air, the mixture is filtered and heated, and the mechanical ventilation cycle continues. The mixture of fresh and returned air is normally closer to the desired room condition than 100% fresh air, requires less heating, and, therefore, saves energy and costs. Where exhaust quantities are small, replacement air can be "borrowed" from adjacent spaces, where significant quantities of exhaust air are involved (e.g., interior briefing rooms), a system must be provided to supply makeup air.

(1) Requirements Odor removal is the main purpose of providing fresh air in a ventilation system. Hence, exhaust outlets should be located above or close to odor sources and the quantity of air exhausted should be related to the source of the odor. Thus, the quantity of air exhausted from a toilet or detention area is usually 2 cfm per square foot of area, while from a briefing or operations room it is usually only 1 cfm per square foot. In the on-duty operations area, some air is exhausted through vents above heat-producing equipment and some from the room in general.

(2) Special Conditions In air conditioned buildings, separate exhaust systems may also be required for conference/briefing rooms (smoking, comfort, or function) and for odor and heat-producing areas such as detention areas and communications rooms. These exhaust systems may be set up to be in use only when the space is occupied. If the area is large enough to require a separate supply air system, then the associated return air system can be arranged to function as an exhaust system when desired.

e. AIR CONDITIONING The heat gain of any space, and hence the amount of cooling it needs, depends not only on outside temperature conditions and on how much direct sunlight it gets (solar heat gain), but also on functional requirements; how many lights are on; how much equipment is in the space, and how many people are in it. Since all the functional and operational requirements and environmental factors contributing to the heat gain of a space vary with the time of day and with the use and orientation of the space, the main problem in air conditioning system decision is to match the amount of cooling delivered to a space to its heat gain and comfort requirements. This may also Involve reheating of cooled air, however reheating is not permitted where personnel comfort is the only consideration. Reheating may be permitted where operational effectiveness depends on prescribed comfort conditions (e.g., prisoner holding, communications center, on-duty operations areas, etc.). Air conditioning systems that meet the operational requirements of military police activities must be designed to set both solar and Internal heat gains.

(1) Room Units Individual units contain a heating/cooling coil, air filter and a small fan or induced air nozzle and provide all the heating and cooling requirements of the space. These units are most commonly used in perimeter systems, however, they can also be used in interior systems. It is comparatively easy to control the quantity of water to each unit thus, each unit can be made into a separate zone relatively inexpensively. Another advantage of room units is that the initial installed cost is less than that of an all-air system. The main disadvantage of the room unit system is that no 'free cooling is possible as with the all-air system.

(2) Central Air Systems The air conditioning systems currently in use represent different methods of utilizing two basic ways of cooling a space: one is to cool air in a central unit with the refrigeration equipment, and then deliver this air to spaces to be air conditioned; the other is to cool water and deliver the water to room units where room air can be blown past a water coil and be cooled. The requirement of a good air conditioning system is that it should provide, in the most economical way possible, the cooling, dehumidification and ventilation requirements of all the various and different spaces in a building. The following four basic central air systems have possible application to military police facilities.

(a) Low-Pressure Air is cooled in a central unit and distributed to various spaces through low-pressure ducts, with a constant air quantity being supplied. The amount of cooling provided to any particular space can be controlled by varying the volume of supply air or the temperature difference between the room and the supply air. The different spaces are grouped in zones for similar geographic orientation and similar use, and the cooled air going to any particular zone is tempered to match the zone requirements. A space will be under or over-cooled to the extent that it differs from the average for that zone. Where individual control is essential, consideration should also be given to the use of terminal

units with low velocity control as a means of providing variable air volume systems.

(b) Multi-Zone In a central unit, some of the air is cooled while the remainder is heated. The various spaces to air condition are grouped in zones, and a separate low-pressure duct runs from the central unit to each zone. The cooling required by each zone can thus be varied by adjusting the proportion of heated and cooled air going to that zone.

(c) High-Pressure, Single Duct Air is cooled in a central air unit distributed through high-pressure ducts, reduced in pressure by air pressure-reducing boxes, and delivered to the various spaces through low-pressure ducts. The cooling provided to any particular space can be varied by adjusting the volume of air delivered to the space and/or by heating this cooled air.

(d) High-Pressure, Dual Duct In a central unit, some of the air is cooled while the remainder is heated. This air is then carried in separate high-pressure ducts to dual-duct air pressure-reducing boxes called mixing boxes, where the hot and cold air streams are reduced in pressure and mixed to meet the cooling requirements of the space served by that particular box.

f. OPERATIONAL REQUIREMENTS Where certain buildings are not to be air conditioned (cooled) based on the weather zone criteria comfort, cooling criteria should be superceded by operational requirements. Generally, the on-duty operations area of the facility will require air conditioning or mechanical ventilation in order to maintain maximum operational effectiveness, The following factors should be considered in determining the operational requirements of HVAC systems.

(1) Noise Any air conditioning system must be designed so that the nose generated by the system is not objectionable. Noise is produced by the operation of the equipment, by the movement of air and water through ducts and pipes respectively, and by the passage of air through air outlets. Where auditory disturbances or physical vibrations can affect the quality of operations, such as in the communications room undesirable equipment noise should be minimized by selecting well-Insulated equipment that is quiet in operation. In addition, residual noise disturbance can be eliminated by requiring that equipment should be Installed on spring or rubber vibration isolators. In some cases, such as with fans and pumps, it may be necessary to mount the equipment on thick concrete pads and then mount the entire assembly on vibration Isolators. In addition, piping that may vibrate should be Isolated from the equipment and from the building structure.

(2) Acoustic Security Norse generated by the movement of air through ducts should be controlled by the use of acoustic lining in the ductwork and/or acoustic lining in all ducts serving operational spaces, such as on-duty desk areas, interview and investigation areas and briefing/conference rooms. Noise generated by air outlets should be controlled by the proper selection and location of these outlets, both for noise and for draft-free operation. However, in corridors and in administrative office areas it may be necessary for the air outlets to create some noise. This is necessary in order to raise the ambient noise level to a level which achieves the overall confidentiality and acoustic security required of law enforcement activities. Too low an ambient noise level encourages improper and unintentional eavesdropping. The installed system should be tuned to the desirable ambient noise level within a design range that is still protective of acoustically sensitive police operations. Reference TM 5-805-4 and ASHRAE Guide.

(3) Temperature Control Generally, HVAC systems require that some means be provided for automatically regulating the heating and/or cooling requirements of individual spaces. This can be achieved by pneumatic, electric, or electronic systems. or a combination of these. A control system will function only within the limitations of the system it serves. Thus, in a fan-coil unit system, if the north and east units are combined into one zone, the automatic temperature controls cannot provide cooling of the east units and heating of the north units.

(4) Humidity Control The process of cooling air is always accompanied by dehumidification, thus during the cooling season humidity control is not a major problem However. reducing the amount of air delivered to rooms. as in a variable volume system, will result in a decrease in its dehumidification capability. Too great a reduction of air may cause a humidity problem. For this reason, in spaces where evidence or records are stored or where groups of people work or gather, some form of reheat is always used. Reheating allows humidity to decrease. During the heating season. relative humidity inside a building can get too low due to the heating of the air. At this time, moisture must be added to the air to raise the humidity level for two reasons first, because a too low humidity dries the skin and causes discomfort: second, because a higher humidity enables the room temperature to be maintained at a lower level for the same degree of comfort, thus saving fuel costs.

g. SYSTEM SELECTION In selecting an HVAC system for military police facilities, consider each of the systems discussed above in terms of the needed individual functional activities and the operational requirements of spaces served by perimeter and interior systems. Tables 3-5 and 3-6 provide general guidance in selecting an appropriate HVAC system. In general, select the least costly and most efficient system in terms of energy consumption and required maintanance.

(1) Perimeter System The need for winter heating and summer cooling for the perimeter areas of the building usually dictates the selection of either the fan-coil unit or the induction unit system. In the case of induction units, ventilation air is furnished by individual room units. In the case of fan-coil unit ventilation air may be furnished by room units (using openings in the perimeter wall behind the units) or may be supplied by a central air system, depending upon architectural considerations and the need for a central air system to supply air to interior areas. In order to match the cooling capacity in air conditioning systems to physical need and functional requirements, the piping and the high-pressure ductwork for induction unit systems must be multi-zoned and related to north-south exposure and heat gains, i.e., all units on the north side of a building are served by the same piping and duct system; all units on the south side are served by another piping and duct system, and so on. When space requirements are not extensive, the north and east systems, and the south and west systems may be combined in the interest of economy.

(2) Interior System For interior space, where cooling is required year round regardless of the weather, an all-air system is usually preferred. The selection of the type of system depends upon the size of the system, the number of zones required, noise considerations and the permanence of these zones. For a small facility requiring multiple zones of operation, a multi-zone air system may be appropriate. For larger buildings with additional zones, the high-pressure single-duct system may be more suitable. Dual-duct systems have specialized properties that provide Increased safety and fire protectron; the largest military police facilities may require such additional provisions.

h. DESIGNING FOR FLEXIBILITY Where a change in environmental services requirements or expansion of a facility is probable, some means of adapting to changes in the size and location of functional activity areas, without requiring major changes in the environmental services system, is desirable. Modules used for space planning are often too small to be used as HVAC planning modules, although electrical and plumbing modules usually coincide. Therefore, a multiple of the space-planning module is typically used. Thus, for facilities that adopt a space-planning module of two feet and require air outlets with low noise and no art-drafts, an interior HVAC module four feet wide by ten to fourteen feet long would be required

(1) Most Flexible A comprehensive approach is required in selecting the environmental services for a functionally integrated facility. While the example requirements listed below provide good modular flexibility, the very high initial installed cost dictates that such a system be carefully evaluated in terms of life-cycle economies and be used only where a reasonable degree of change in the size, mission or function of operational and administrative support activities is probable or predictable. Such a system may be required in functional areas where a high degree of flexibility is essential to operational effectiveness. The basic requirements of acomprehensive environmental services system are:

(a) Each interior module should have an integrated lighting fixture and air outlet.
(b) Each alternate outlet-fixture in both directions in a checkerboard pattern should be a supply air outlet and the other a return air outlet.
(c) Each alternate perimeter module should have a room unit.
(d) Each perimeter module should have an integrated light fixture and air outlet for ventilation air purposes, with supply air units alternating with return air units.
(e) Each perimeter room unit should have automatic temperature controls, while the ductwork to the air outlets should be zoned.
(f) Perimeter and interior modules should be placed in a permanent space-divider grid to insure compatibility of space organization.

(2) Less Flexible Where a lesser degree of flexibility is required, the interior HVAC module may be increased in size to five or six feet square, or to four feet wide by eight feet long.

(a) The air outlets need not be integrated with the lighting fixtures, or the module with the partition system, but a separate air outlet could be provided connected to the ductwork by small flexible ducts.
(b) Air outlets should be provided only to meet the requirements of the initial space organization concept, partition layout, open operational activities or clustered administrative support.
(c) Blanked-off connections (or stubs) should be provided at the main ducts for future relocation of the air outlets.
(d) At the perimeter, a room unit should be provided every eight feet as before, however, ventilation air would be supplied through separate air outlets using small flexible ducts.
(e) Even this degree of flexibility Increases the cost of environmental services and should be limited to those areas where functional or operational requirements can be definitely established by the using service.

i. MECHANICAL EQUIPMENT The mechanical equipment required by HVAC systems should always be located as close as possible or central to the primary areas it serves, but on the exterior of the facility, in a locked and secure space accessible from a main corridor. For large buildings, it may be more economical to have more than one mechanical equipment room. Roof-top mechanical equipment rooms do not require

Table 3-5: Qualitative Analysis of Perimeter HVAC Sub-Systems

Key:
Good +
Fair O
Poor –

System Characteristics

Alternative Subsystems	Installed Cost	Operating Cost	Noise	Modular Flexibility	Zone Control
Fan-Coil Room Unit	+	–	O	O	+
Induction Room Unit	+	–	O	O	+
Low Pressure Air	O	O	+	O	–
Multi-Zone Air	O	O	+	–	O
Single Duct High Pressure Air	O	+	+	+	+
Dual Duct High Pressure Air	–	O	+	+	+

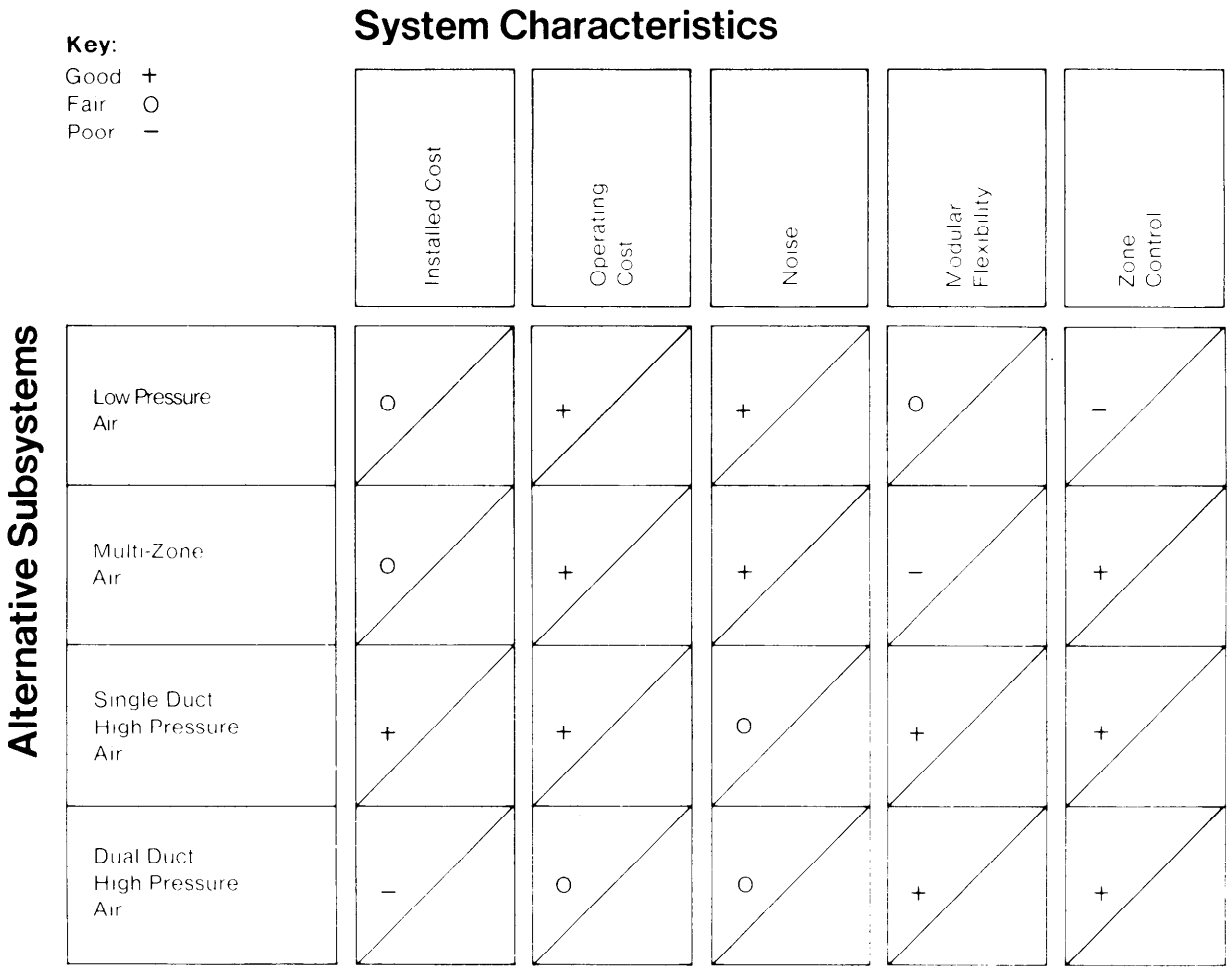
Note: A quantitative analysis of perimeter sub-systems, which is helpful in evaluating suitable alternates, can be obtained by the following procedure:

a) Install a numerical value relative to the priority of concern for project development represented by individual system characteristics. For five similarly important characteristics choose a consecutive positive range, such as 1, 2, 3, 4, 5, etc. When the characteristics represent greater differentials, such that noise or flexibility factors are insignificant, for example, choose a negative/positive range, such as –10, –5, 0, +5, +10, etc.

b) Substitute +1, 0, –1 for good, fair and poor respectively.

c) Multiply the value of each characteristic by the qualitative value of each sub-system alternative and add horizontally.

Table 3-6: Qualitative Analysis of Interior HVAC Sub-Systems



Note: A quantitative analysis of interior sub-systems, which is helpful in evaluating suitable alternatives, can be obtained by the following procedure

a. Install a numerical value relative to the priority of concern for project development represented by individual system characteristics. For five similarly important characteristics choose a consecutive positive range, such as 1, 2, 3, 4, 5, etc. When the characteristics represent greater differentials such that noise of flexibility factors are insignificant, for example, choose a negative, positive range such as – 10, – 5, 0, + 5, + 10, etc.

b. Substitute + 1, 0, – 1 for good, fair and poor respectively.

c. Multiply the value of each characteristic by the qualitative value of each sub-system alternative and add horizontally.

space for outside air intake and exhaust ducts, and replacing equipment is easier than with basement or ground floor equipment rooms. However, these advantages are offset somewhat by the increase in the cost of the structure and the additional attention that has to be paid to vibration and noise control.

j. ELECTRICAL All electrical work shall be in accordance with DOD 4270.1-M and Technical Manual TM 5-811-1 through 4.

(1) Electrical Service Service to the building should be extended underground from the Installation electrical distribution system

(2) Electrical System Electrical service and distribution equipment will be located in the utility room, adjacent to the mechanical equipment room. Panel boards for signal alarm lighting and receptacle switches should be located either in a separate electric closet in the utility room when supervision is not required or possible or on a fixed wall located to minimize wire and conduct lengths either in the duty agents office when security is a factor or in the supply and maintenance room when logistics is the main consideration. Power to a switch which disconnects the intrusion detection system for the building will be supplied from the line side of the distribution panel. This is required in order to prevent AC power from being inadvertently or intentionally interrupted. The disconnect switch handle will be capable of being padlocked in either the on or off positions.

(3) Distribution System Characteristics Provision of electrical outlets for field office activity areas should be made on the basis of initial requirements of individual functional activities. The extent of services depends on the degree of flexibility required and on the probability of change. Provide for electrical outlets in all office areas. Where offices are small and fixed partitions exist, permanent wiring may be run in partitions and receptacles provided. Where areas are large and without subdividing partitions, underfloor ducts should be provided for both power receptacles and signal telephone outlets so that receptacles may be installed or removed as required.

(4) Emergency Power Consideration should be given to the basic necessity of providing emergency power to enable people to find their way out of the building when normal power falls, especially after dark Emergency power is required for exit signs, stumble lights or back-up power for the fire alarm system and security system. The number and size of systems required to be on emergency power will depend upon the probability of failure of the primary power source. The emergency power requirements for individual projects must be coordinated with the local using service.

(5) Auxiliary Support Power Back-up power may be provided as auxiliary support by individual battery units, a central battery system or by an engine-generator set. Determination of the type of auxiliary support provided will be based upon economics alone.

(6) Special Requirements Where authorized by the local installation and required by the using service, provisions will be made in the building design for the addition of an uninterruptible source of power. Uninterruptible power sources will not be procured with MCA funds. Such provisions as an operating agency-furnished mechanical equipment requirement will be made.

(7) Exterior Site Requirements Exterior and site electrical requirements should be established in conjunction with the site planning and landscaping plan. Exterior receptacles and power sources for telephones, lights, illuminated signage and other such requirements should be selected or designed for accessibility, safety and ease of maintenance. Exterior lighting should be provided for the staff and public parking areas, for active operational areas, for storage and Impoundment areas and for the pedestrian walks around the facility.

(8) Special Equipment The electrical power requirements of all electrical or electronic equipment and fixtures should be determined and provided for this includes reproduction/duplication equipment, photographic equipment, electronic data processing and communication equipment, recording and transmission equipment and special Intrusion detection and alarm devices. It does not Include electric typewriters or mini-computers or other small equipment which is usually plugged into the convenience receptacles ordinarily provided.

(a) Security Equipment Intrusion detection devices are required for the mail, arms and evidence rooms and for other special space where intrusion detection is required to maintain secure conditions. Intrusion detection devices and other security equipment should be connected to the military police station security monitor. Annunciator/register panels should be located in the on-duty operations area. In addition to these devices, a closed circuit television system will be installed to monitor the secured parking areas as well as exterior entrances to the building and other sensitive areas as determined by the provost marshal and security officer. CCTV monitors will be required within the on-duty operations area and remote cameras will be located to provide unobstructed viewing by on-duty desk personnel.

(b) Communication System Normal communication is achieved by means of the telephone system. Requirements for telephones should be established at the time of space planning, and empty conduits for telephone cable provided in large general office spaces, the empty conduits for telephone cable are provided in a manner similar to conduit for receptacles, as discussed earlier. Cellular floors, when used, may have cells assigned for telephone wiring. Underfloor duct systems require an extra, separate duct for telephones. Provisions must be made for radio equipment required. Office intercom is satisfactorily provided by the phone system.

(c) Electrical Conduits Empty electrical conduits will be used where future special communications or electronics equipment is required. Current regulations will allow only empty conducts when MCA funds are used. Procurement of CCTV cables and equipment is not authorized under MCA programs.

(d) Fire *and Safety Equipment* Fire and safety equipment should be provided in accordance with DOD Constructron Criteria Manual 4270.1-M, the requirements of the National Fire Protection Association (NFPA), and Technical Manuals TM 5-812-1 and TM 5-813-6.

(9) Smoke Detection System A smoke detection system should be provided for all the air-handling systems, arranged in such a way that these systems supply 100% of outside air and exhaust all the air circulated whenever smoke is detected in the air-handling system or the fire alarm system is activated. This is to clear the building of smoke, which is a greater hazard to people than fire. In addition, smoke detectors should be provided in all areas where fires could start and not be detected easily, such as evidence and records storage rooms, janitor's closets, interview rooms and under floating or raised floors.

(10) Fire and Smoke Control Fire and smoke control in air-handling systems must be in accordance with NFPA Standard 90A. Standpipes and fire hose cabinets should be provided in buildings two stories high and over with more than 10,000 square feet on any floor. Standpipes shall be as required by DOD Construction Criteria Manual 4270.1-M and NFPA standards 13 and 14.

k. PLUMBING, WASTE AND SERVICE SYSTEMS All plumbing requirements should be provided in accordance with DOD Construction Criteria Manual 4270.1-M and technical manuals and regulations governing special sub-system requirements. TM 5-810-5 is a primary reference document for special equipment requirements, and DOD Construction Criteria Manual 4270.1-M contains tables providing basic design guidance for the allocation and scheduling of plumbing fixtures. Where special conditions dictate the selection of a site for project development that is not adequately serviced by primary water and waste disposal systems, it may be necessary to connect building service lines to these systems at some distances: this requirement should be guided by engineering criteria contained in TM 5-813-5 and TM 5-814-1.

(1) Hot and Cold Water Plumbing Service Hot and cold water service requirements are similar to civilian domestic systems employed in buildings with needs similar to military police facilities. While specific guidance for military construction does not exist, a comparison of Tables 10-1 and 10-6 in DOD Construction Criteria Manual 4270.1-M may assist in a decision on the allocation of services. In all cases, separate male and female toilets will be provided for use by visitors and staff. lndividual detention and holding facilities will be provided in the lounge area for servicing breaks and field office meetings.

(2): Water Heaters Water heaters for domestic hot water use should be sized in accordance with TM 5-810-5, with steam or hot water required being supplied by the heating system. Domestic hot water recirculating pumps should be used to maintain water temperature at the plumbing fixtures Refer to TM 5-810 -5 instructions.

(3) Sanitary Drainage Systems The vertical relationship between existing installation sanitary sewer lines and facility services should be such that the proper installation of a sanitary drainage system will provide a flow by gravity and convey drainage from all plumbing fixtures and equipment to primary sanitary sewer systems. Where site conditions are such that direct gravity flow is not possible, sanitary drainage below the Invert elevation of the primary service system should be collected and pumped out of the facility, as prescribed in TM 5-814-2. Below-ground vaults for equipment, discharge connection and cleanouts are required when such conditions exist. The cost of this additional plumbing requirement should be considered as a factor in favor of alternate site selection.

(4) Storm/Water Drainage Systems Site and facility storm drainage and interior floor drains should flow by gravity to the main drainage system. The need for additional sump pumps will depend on the location and type of storm/water drainage system used by the local installation. Where interior roof drains are provided, they should be designed in accordance with TM 5-810-5 and integrated with site drainage in accordance with TM 5-813-5 and TM 5-814-1. Floor drains should not be connected with the roof drainage system